USING LANGUAGE KNOWLEDGE TO COMPREHEND ACADEMIC DISCOURSE

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Abstract

The purpose of this study was to investigate the effects of using the Text Pattern Intervention in secondary reading classes to improve the reading comprehension of struggling learners. The study took place in two parts, which included (a) a design-based research sequence with three phases (i.e., preliminary, prototype, and pilot) and (b) a validation study. During the preliminary and prototype phase, the research was used to inform the development of an intervention. The effects of the intervention were further studied during the pilot, and the validation phase involved a comparison-group study of 49 students across three separate high schools. Three teachers delivered instruction in the intervention to their experimental class. The comparison classes received instruction as usual. Results indicated statistically significant differences between groups in favor of Text Pattern Intervention use on a content area passage measure. Social validity measures indicated a high degree of student and teacher satisfaction with the intervention.

Dedication

To my very first teacher whose wisdom and generosity have forever shaped my professional and personal aspirations. I love you Mom.

Acknowledgments

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CHAPTER I

INTRODUCTION

Culturally and linguistically diverse children enter U. S. schools with varied language experiences. However, depending on their specific backgrounds, these differences can pose challenges in educational institutions, which tend to emphasize print-based learning and prioritize written over spoken language (Schleppegrell, 2001). A culture such as ours that values book reading naturally gravitates toward written language, so children raised in this type of environment will likely be familiar with the grammatical features embedded within written text (Bialostok, 2002). Therefore, students with regular exposure to written language patterns may academically outperform their peers. Additionally, students who struggle with the underlying language aspects of written text tend to demonstrate reading difficulties even if they had the opportunity to interact with written language patterns on a consistent basis.

As students grow older, academic demands increase. They must read longer, more complicated textbooks and are expected to understand content area texts regardless of their previous experiences, acquired skill sets, or language abilities (Deshler & Hock, 2007; Schleppegrell, 2001). Even though adolescents from diverse backgrounds (e.g., non-native English speakers, refugees from other countries, and children living in impoverished socioeconomic conditions) attend secondary school, educators require everyone to engage in book learning. Therefore, the purpose of this chapter is to: (a) review the purposes for written language patterns, (b) outline the educational setting demands related to language as students transition from the primary to the secondary grades, (c) discuss the characteristics of language in struggling readers, and (d) summarize the existing literature linking instruction of non-phonological language components to reading comprehension.

The disparity between proficient and struggling readers looms larger as children enter the fourth grade (Chall, 1983; Deshler & Hock, 2007). That is, educators generally focus on teaching students how to read in the primary grades, whereas a shift to content-area learning occurs in middle and high school (Fang, Schleppegrell, & Cox, 2006). According to Christie (2002):

> It is with the transition to the secondary school that students must learn to handle the grammar of written English differently from the ways they handled it for primary schooling, and that it is these changes that constitute the 'advanced literacy' that is needed for future participation in further study and many areas of adult life. (p. 45)

Although educational researchers have broadened their focus on basic literacy skills (e.g., phonemic awareness, alphabetic knowledge, and fluency) to include reading comprehension and vocabulary in the higher grades (e.g., Shanahan & Shanahan, 2008), to date these approaches have not directly addressed how students' language knowledge affects comprehension.

Researchers operating from a Systemic Functional Linguistics (SFL) perspective, as opposed to an approach that emphasizes the technical aspects of language (i.e., phonology, syntax, semantics, and pragmatics), assert that language involves making sense of the world (Halliday & Matthiessen, 2004). In other words, our world experiences shape the ways that we interact with others. Before they start school, most children communicate verbally with their peers and elders, and in the process become familiar with the words and discourse patterns that they encounter on a regular basis (Brown, 2006). Moreover, the language that children incorporate into their repertoire is often contingent upon social norms. Humans construct meaning from their experiences, and the ensuing discourse tends to follow a predictable pattern (Coffin, 2006).

As new knowledge emerges, the social norms of the people producing the discourse change over time. Within an educational context, for example, even though all subject-matter experts use written language structures to construct meaning in academic texts, the nature of the language in a history text differs from that of a science text (Rose, 2006). Martin (2009) referred to these different discourse structures as genres, or sociocultural situations where the language constructed fits a particular group's social norms. The students who have the language skills necessary to make sense of content area texts have a higher probability of succeeding academically than their peers with lower language skills (Schleppegrell, 2007).

Good readers intuitively know that if they attend to the language structures and goals of discourse within a given genre, they will better understand the text (Christie, 1989). In contrast to good readers who display typical language development, atypical learners often struggle in school because they have not acquired adequate language skills, such as knowledge of the abstract vocabulary and grammatical structures that appear in written discourse in our culture (Catts, Adlof, & Weismer, 2006; Coffin, 2006; Scarborough, 2005). Because the language of school tends to be formal—"language that was written in order to be spoken" (Halliday, 1987, p. 55), content area texts contain complex grammar structures and technical words. The use of formal language frequently presents struggling readers with comprehension problems (Fang et al., 2006; Scott & Balthazar, 2010).

This difficulty with comprehension is evident in the recent National Assessment of Educational Progress (NAEP) report measuring the reading performance of a nationally representative sample of fourth and eighth graders (National Center for Education Statistics, 2009). The results showed that only 32% of eighth-grade and 33% of fourth-grade students read at or above the proficient level. Thus, given the fact that more than half of the students struggled

to make meaning from lengthy content area passages, educators are challenged to attend to the reading comprehension needs of school-aged students.

The readers who performed below the proficient level included students with learning disabilities (LD). The federal LD definition involves a deficit in understanding spoken or written language (Amendments to the Individuals with Disabilities Education Act, 2004). Students with LD display a wide variety of literacy problems that include both phonological processing and language comprehension (i.e., non-phonological) issues (Catts & Hogan, 2003). In other words, while many students with LD may have difficulty with decoding and fluency, some read words accurately and fluently and still demonstrate poor comprehension (Nation, 2005), a deficit that interferes with their ability to understand written text (Catts et al., 2006).

Nation (2005) found that the lexical (i.e., vocabulary), semantic (i.e., meaning), pragmatic (i.e., context), and syntactic (i.e., word order) features of text presented both children with specific language impairments (SLI) and poor comprehenders with difficulties, providing further evidence that non-phonological language problems influence the reading comprehension of students with LD. Even though the terminology they use varies, several language researchers assert that understanding written text requires knowledge in three non-phonological areas: (a) receptive vocabulary, (b) text-level processing, and (c) syntax (Berman & Ravid, 2009; Catts & Hogan, 2003; Nation; Schleppegrell, 2001).

The first non-phonological area, vocabulary, involves the ability to learn and use new words. Although most of the words that appear in elementary textbooks are used in everyday conversation (Kamil et al., 2008), in grades 4 through 12, students encounter increasingly abstract words (Wauters, Telling, Van Bon, & Van Haaften, 2003). For example, Schleppegrell (2001) found the following sentence in a secondary-level text: “The formation of sedimentary

rock is closely associated with water" (p. 440), and noted that the sentence contained six content specific words (i.e., *formation, sedimentary, rock, closely, associated, water*). To make meaning from this sentence, readers need to understand each discipline-specific word. Several reviews synthesizing the literature on reading comprehension found that students learn vocabulary through direct instruction that explicitly targets word learning and gives students multiple exposures to terminology across different contexts including the general education classroom (Gersten, Fuchs, Williams, & Baker, 2001; Kamil et al., 2008; Torgesen et al., 2007). Strong evidence supporting the relationship between word learning and reading comprehension exists, but vocabulary is not the only skill necessary for understanding text (Faggella-Luby & Deshler, 2008; Kamil et al., 2008).

Readers also need text-level processing skills, which is the second non-phonological language component. Students must construct meaning from increasingly longer texts as they progress through middle and high school, so educational researchers have turned their attention to cognitive strategies that teach readers how to think and act when they approach printed text (Faggella-Luby & Deshler, 2008). Research synthesizing the effects of cognitive strategies instruction has grown in the last decade (e.g., Edmonds et al., 2009; Kamil et al., 2008; Mastropieri, Scruggs, & Graetz, 2003; Swanson & Hoskyn, 2001; Torgesen et al., 2007). These reviews provide evidence showing that students who receive general strategies instruction (e.g., self questioning, summarizing, and peer-tutoring) demonstrate improved reading comprehension outcomes. However, learning text-level processing strategies does not explicitly teach students to comprehend discipline-specific language patterns (i.e., syntax) and terminology, which vary by subject matter (Shanahan & Shanahan, 2008).

The discipline-specific language patterns used by content area experts include syntactic structures, the last non-phonological language component. Syntax is defined as word order or rules for constructing a grammatically correct sentence. According to SFL theorists, grammar structures serve a particular function. Academic writers often use passive voice to distance themselves from their message and to appear more objective (Fang et al., 2006), which often results in longer sentences that are harder to understand. In addition, noun phrases, or a combination of related words containing a noun, describe abstract concepts and use word orders that do not follow spoken language patterns. Poor comprehenders frequently struggle to understand written text that contains noun phrases and other syntactic structures, such as connectives (e.g., *therefore, before,* or *when*), or words that join phrases together by showing how they relate to each other. For example, the sentences in the following text contains passive voice (italicized), multiple noun phrases consisting of three or more words (underlined) and connectives (bold):

> The reason for the marked differences in the sensitivity among studies evaluating venous ultrasound imaging for asymptomatic proximal venous thrombosis is uncertain. **Because** of this relatively high incidence of thrombosis **despite** primary prophylaxis, *routine venography* ***before*** *hospital discharge* ***in addition*** *to primary prophylaxis is advocated for by some authorities* to detect silent deep venous thrombosis in patients who have major orthopedic procedures.

Just as good readers struggle to understand text when they lack familiarity with a particular genre, students with language and learning disabilities demonstrate problems understanding discourse that contains syntactic structures, such as passive voice, noun phrases, and connectives (Fang et al., 2006; Schleppegrell, 2001; Scott & Balthazar, 2010).

Poor comprehenders with LD not only need vocabulary instruction and text-level processing strategies, they must also receive instruction that targets syntax. Scott and Balthazar (2010) reviewed the literature describing the grammar structures that commonly appear in academic text and noted the instructional practices leading to comprehension outcomes. Moreover, the authors offered four principles to guide language pattern instruction: (a) modeling and practicing how academic authors use language patterns; (b) providing opportunities for students to engage in reading, writing, listening, and speaking tasks at the sentence level; (c) repeatedly exposing students to language patterns; and (d) using materials from the students' content area classes. These principles run parallel to the literature describing the best practices for teaching students with LD, which recommends that teachers offer students guided practice opportunities with controlled materials after receiving direct instruction and watching teacher think-alouds and models (Edmonds et al., 2009; Gersten et al., 2001; Kamil et al., 2008; Mastropieri et al., 2003; Swanson & Deshler, 2003; Torgesen et al., 2007).

Despite the need for explicit instruction in grammar structures, a review of the existing literature on reading comprehension instruction as it relates to syntax revealed only four studies (Ebbels & van der Lely, 2001; Ebbels, van der Lely, & Dockrell, 2007; Hirschman, 2000; Levy & Friedmann, 2009). However, given the evidence that teaching other non-phonological language skills (i.e., vocabulary and text-level processing) helped students with reading comprehension problems, an intervention that specifically addresses the syntactic structures appearing within and across disciplinary textbooks seems warranted. An intervention that explicitly teaches grammar patterns to struggling readers may increase the comprehension of students with LD. However, researchers developing interventions, including one that targets language patterns, must profile the needs of the students before, during, and after instruction to

adequately measure whether or not the intervention had an effect on comprehension (Ehren, Deshler, & Graner, 2010).

The purpose of this study was to develop and test the effects of an intervention for teaching students how to identify and understand language patterns in content area text. The intervention was designed for secondary teachers to use in classes where both students with and without disabilities struggle to comprehend academic discourse. The study used the existing literature describing the mismatch between academic texts and struggling adolescent readers to create an intervention that directly teaches students how authors use grammar structures in social studies, science, and English language arts texts. The intervention employs explicit instruction, including description, modeling, and practice with feedback. The interrelated goals of this study were to (a) review studies that examine the language patterns of content area texts, (b) develop and pilot a text structure intervention, (c) determine whether or not teachers are able to implement a language pattern intervention with fidelity given ongoing instructional coaching, (d) evaluate the effects of teaching a syntax intervention on student comprehension, and (e) assess the feasibility and palatability of teaching the intervention in a classroom setting.

The fields of linguistics and education use different terminology to refer to similar concepts. Because this study attempts to bridge the two disciplines, some confusion may occur when certain terms are used. A glossary appears in Appendix A to clarify overlapping terms and to guide the reader.

CHAPTER II

REVIEW OF THE LITERATURE AND THE RESEARCH PROBLEM

Educational researchers who study developmental language trends have found that as children mature, they acquire facility with different language modalities. Young children develop the ability to speak before they learn to write, and the mean number of words and clauses that they produce increases with age (Berman & Ravid, 2009). In contrast to spoken language, the authors who write the academic textbooks used in K-12 education follow the language conventions used in their particular discipline (Harman, 2009), which include content-specific words and complex language structures that turn concrete processes and actions (e.g., *to hear*) into abstract concepts (e.g., *a private hearing in judges chambers*). Although most students do not directly experience the phenomena to which academic texts refer; school-aged readers must learn to decipher written language structures in increasingly longer texts.

Many adolescents with LD have difficulty making sense of content area texts because of their language deficits. These students often display problems with word recognition and listening comprehension (Catts & Hogan, 2003; Hoover & Gough, 1990). Students with word recognition issues demonstrate phonological processing deficits whereas poor comprehenders may also struggle with non-phonological language components (Catts et al., 2006; Nation, 2005). Because these non-phonological skills (i.e., vocabulary, text-level processing, and syntax) require that readers apply their existing language knowledge to understanding textbook passages, students who lack proficiency with language will struggle with comprehension (Nation, Clarke, Marshall, & Durand, 2004).

The body of research on early reading interventions continues to grow (e.g., Foorman & Connor, 2011; McCardle & Chhabra, 2004), but by their nature, these studies tend to prioritize

phonological over non-phonological issues (Deshler & Hock, 2007). Significantly less work exists with poor comprehenders at the secondary level (Catts et al., 2006; Vaughn et al., 2008) even though students continue to struggle with understanding text in their middle and high school years. In contrast to younger children, older students with reading comprehension deficits frequently exhibit adequate phonological processing yet poor semantic, pragmatic, and syntactic skills (Nation, 2005; Nation & Norbury, 2005). Therefore, reading interventions for adolescents must address non-phonological (i.e., vocabulary, text-level processing, and syntax) in addition to phonological processing and word level skills (Berman & Ravid, 2009; Nation; Schleppegrell, 2001).

Because of the relative shortage of studies examining reading comprehension from a language perspective, especially in the area of syntax, the purpose of this review was to motivate the best approach to designing and investigating the effects of an intervention that teaches poor comprehenders with LD how to decipher grammar structures in academic texts. More specifically, this study used a design-based research methodology to develop an intervention. Design-based research attempts to address questions raised by the literature within a local context (Levy & Ellis, 2004), which takes into account a specific learning situation. As such, this review consists of two parts: (a) a literature review and (b) a design-based research sequence.

Literature Review

The literature review will explore four areas. First, a description of Systemic Functional Linguistics (SFL) theory is provided to demonstrate how social norms tend to dictate the language structures that appear in various text genres. Second, a brief description of the language and literacy skills that students must have to comprehend academic discourse is

offered, and the studies exploring the relationship between syntax and reading comprehension are reviewed. Third, a critical review of studies investigating the grammar of history, science, and English language arts texts is provided to identify the language patterns that appear within and across the different content areas. Finally, a summary of the literature on reading comprehension measures is presented to determine which tests demonstrate adequate sensitivity.

The research included in the literature review falls into three broad categories. The first group focuses on studies that examine the effects of teaching syntax interventions to students with language issues whereas the second group of studies analyzes academic discourse from an SFL perspective. The third group of studies investigates the validity of various reading comprehension assessments. A search of the Educational Resources Information Center (ERIC) and PsycINFO electronic databases yielded the literature cited in this review (see Appendix B for a list of search terms). The studies selected had to measure the effects of teaching syntax on reading comprehension, investigate content area text from an SFL perspective, or use an experimental design to analyze the technical adequacy of a reading comprehension assessment. Once selected, each study was reviewed to identify the (a) purpose and research design, (b) procedures and measures, (c) number of subjects and/or texts, and (d) results for all learners including those with disabilities.

Systemic Functional Linguistics Theory

According to SFL theorists, language serves a specific purpose: to facilitate social interaction (Halliday & Matthiessen, 2004). Historically, language emerged as a tool to facilitate communication between people engaging in collective activities, such as hunting (Roth & Lee, 2007). Although researchers have traditionally studied artifacts to understand the cultural aspects of a society, cognitive anthropologists have suggested that a group's language patterns

represent their view of the world and reveal more about a culture's shared knowledge base (Brown, 2006).

Members of a community follow established customs and conventions that shape the language patterns they use to communicate with each other (Graesser, Millis, & Zwaan, 1997; Rose, 2006). These norms include the *textual* tools (i.e., connectives that join phrases together) used to organize discourse and the *ideational* resources (i.e., discipline-specific terminology and noun phrases) that the group has deemed socially appropriate. As humans exchange information with each other, they form *interpersonal* relationships that convey their stance on the matter at hand (see Figure 1).

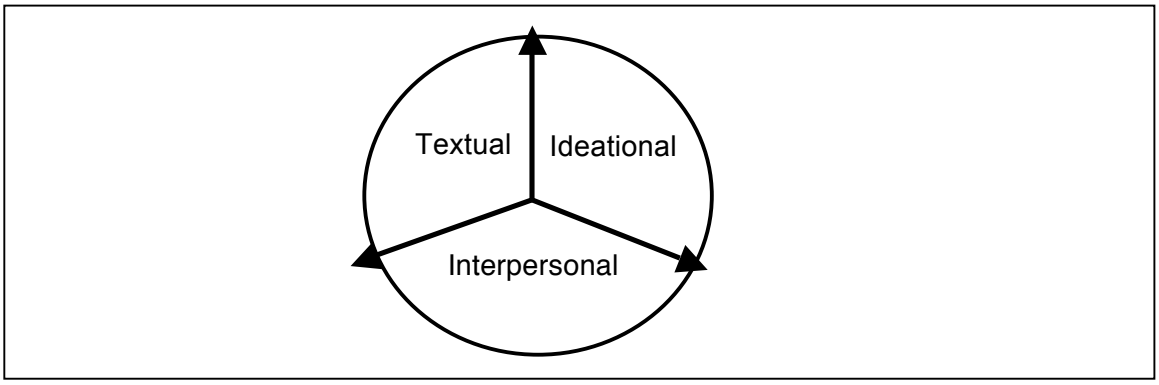

Figure 1. The three functions of grammar. Adapted from "Genre and Language Learning: A Social Semiotic Perspective," by J. R. Martin, 2009, *Linguistics and Education*, *10*, p. 12.

People who work in social institutions, including schools, tend to follow certain norms. For example, many special educators use acronyms to refer to concepts that they encounter on a regular basis (e.g., IEP for Individual Education Plan or RTI for Response-to-Intervention). The complex grammar structures in academic texts tend to differ from everyday language structures by containing significantly more discipline-specific vocabulary terms, more abstract content words per clause (i.e., lexical density), and greater instances of nominalizations, or words that have been converted into noun phrases (Schleppegrell, 2001). SFL researchers assert that the

grammatical features present in academic texts follow specific patterns, which vary with the particular function of the language at hand (Coffin, 2006). As a result, the language patterns of an expository (i.e., informational) text will differ from narratives, which typically follow a plot or storyline. This information has educational implications because many adolescents struggle to comprehend these specific language patterns.

Traditionally, educators have used readability formulas to calculate the average the number of words in sentences, but these measures are not sensitive to how language changes across disciplines and grade levels (Kotula, 2003; University of Memphis Department of Psychology, 2006). Recently, SFL researchers have worked to design literacy pedagogy that helps students comprehend academic discourse by exploring the language patterns used in a particular context. These *registers* are shaped by three variables: (a) mode—strategies for combining phrases, (b) tenor—the interpersonal stance between author and reader, and (c) field—the topic at hand (see Figure 2).

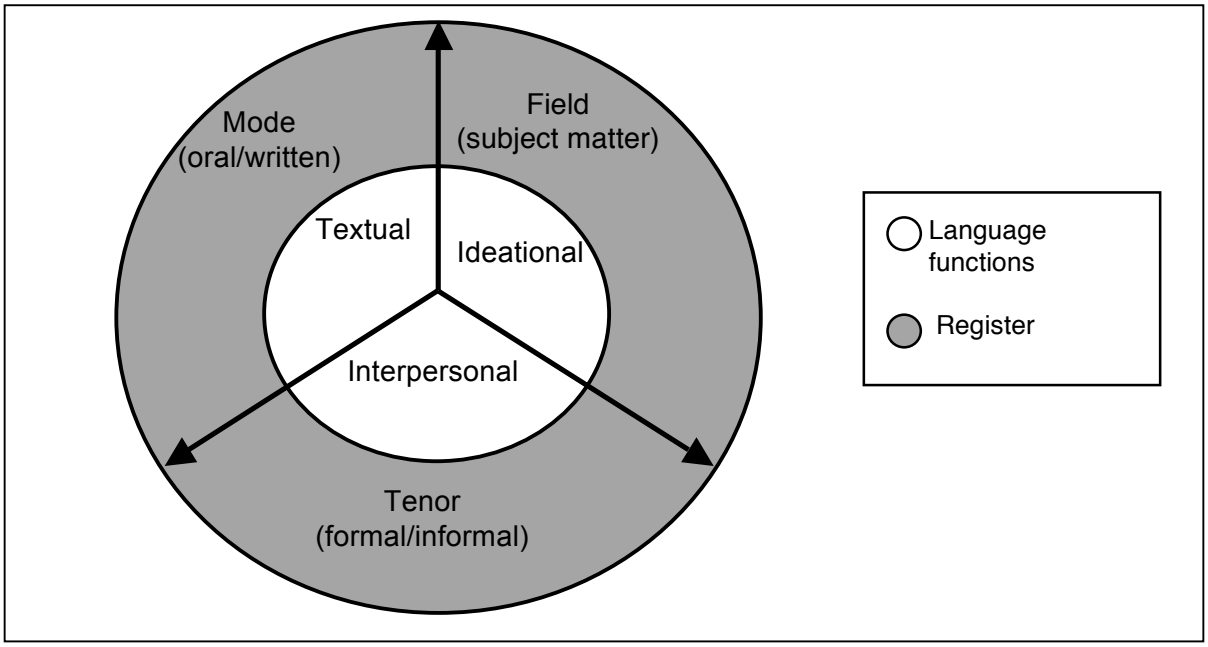

Figure 2. Discourse patterns change with social setting. Adapted from "Genre and Language Learning: A Social Semiotic Perspective," by J. R. Martin, 2009, *Linguistics and Education*, *10*, p. 12.

Registers vary across settings, which means that the participants' *mode* of communication also changes (Martin, 2009). To demonstrate these changes in register, consider how a person's demeanor varies in different social situations. People interact one way in a formal setting, but their behaviors change when they engage in informal activities. For example, even if teachers maintain a professional demeanor in the classroom, they use different language structures when coaching athletics. In addition to this change in *tenor*, the ideas that are exchanged vary according to the subject matter, so students need to discern how the language *field* of social studies differs from other content areas, such as science and English language arts.

Because of these changes in register, students need to develop familiarity with the various genres (i.e., narrative versus expository discourse) in school. In a study comparing the initial portions of 160 narrative and expository texts written by grade school, adolescent, and adult authors, Berman and Katzenberger (2004) found that older writers produced longer texts. Furthermore, the researchers concluded that children develop the ability to write narratives more readily than expository texts, and the cognition involved in organizing content logically develops with age. In other words, the organizational demands of expository discourse require complex cognitive and language skills that only literate learners possess.

To summarize, SFL theorists assert that the social norms of a group of people shape the language conventions they use when engaging in academic writing. Because academic language patterns vary by content area (e.g., history, science, and language arts), struggling readers, who lack the language knowledge that their typically developing peers have, may need to learn how academic writers use grammar structures to convey their thoughts. These students stand to benefit from instruction that specifically addresses the connection between language and learning.

Language and Literacy Skills for Comprehending Academic Discourse

To make the link between language and learning more explicit, educational researchers are challenged to examine how language comprehension skills affect the learning of school-aged children. Cummins (1979) wrote a seminal article that language experts in education often reference (e.g., Baker, 2006; Echevarria, Short, & Powers, 2006). Cummins made a distinction between two types of language skills: (a) spoken language skills, which he refers to as Basic Interpersonal Communication Skills (BICS); and (b) academic language skills, which he refers to as Cognitive Academic Language Proficiency (CALP).

Studies investigating the language proficiency of school-aged children appear to support Cummins' proposal. As students develop BICS (i.e., spoken language skills), they learn basic reading prerequisites, such as phonological awareness, letter-sound association, auditory processing, and fluency (August & Hakuta, 1997; Denton, Wexler, Vaughn, & Bryan, 2009; Haager & Windmueller, 2001; Klingner, Artiles, & Barletta, 2006). Indeed, Geva (2006) found that phonological processing skills account for a large amount of variance in English word reading skills, so it appears as if basic reading skills relate to BICS.

Despite the data showing that phonological processing skills predict early reading ability, competent readers must also demonstrate CALP skills. Language proficient students draw on non-phonological language components, including vocabulary, text-level processing, and syntactic knowledge, to understand academic discourse (August & Hakuta, 1997; Gersten & Baker, 2003). For instance, vocabulary knowledge and text-level processing skills help readers construct meaning from content words and figurative language so that they better comprehend the text (Catts & Hogan, 2003; Nation, 2005; Schleppegrell, 2001). Several literature reviews have examined the effects of teaching CALP skills (i.e., vocabulary and text-level processing) on

reading comprehension and found evidence supporting these practices (Edmonds et al., 2009; Faggella-Luby & Deshler, 2008; Gersten et al., 2001; Kamil et al., 2008; Mastropieri et al., 2003; Swanson & Hoskyn, 2001; Torgesen et al., 2007). In addition to vocabulary and text-level processing skills, students who lack knowledge about grammar conventions need direct instruction to learn how to focus on high information text items like expanded noun phrases and other syntactic structures (August & Hakuta; Gersten & Baker; Rice, Hoffman, & Wexler, 2009). However, only four studies analyzing the relationship between teaching grammar structures and reading comprehension exist (Ebbels & van der Lely, 2001; Ebbels et al., 2007; Hirschman, 2000; Levy & Friedmann, 2009).

The first study was conducted by Levy and Friedmann (2009) who administered a syntactic intervention to one 12-year-old student diagnosed with a learning disability (LD) and a specific language impairment (SLI). The participant's comprehension of relative clauses (i.e., words that offer more information about a noun in the same sentence) was compared to 28 children with typical language abilities. Treatment consisted of 16 sessions where the participant learned syntactic rules through color-coded parts of speech (e.g., the subject of the sentence was blue). The participant significantly improved his comprehension after receiving instruction and maintained his performance when tested 10 months after treatment.

The next study, conducted by Ebbels and van der Lely (2001), investigated the effects of teaching dependent relations to four 11- to 13-year-olds with SLI. The participants' comprehension of passive sentences and 'wh' questions (i.e., sentences with semantically reversible subjects and objects) was measured on a weekly basis over the course of four weeks. Treatment consisted of 30 hours of therapy where the participants learned how to group words using a visual coding system (i.e., parts of speech were assigned specific shapes). Three of the

four participants significantly improved their comprehension of grammar structures after receiving instruction.

In a larger study, Ebbels and colleagues continued their work with 27 adolescents with SLI (Ebbels et al., 2007). The participants' comprehension of verb argument structure was measured at three different points in time. The 11- to 16-year-olds who participated in this study were randomly assigned to three treatment groups. The first condition consisted of instruction in a visual coding system (i.e., syntactic-semantic therapy), the second condition included instruction targeting verb meaning (i.e., semantic therapy), and the third condition involved instruction in inferential text-level processing (i.e., control therapy). Treatment took place over the course of nine 30-minute sessions, and the participants receiving syntactic-semantic or semantic therapy significantly improved their comprehension of verb argument structure when compared to the control group.

Whereas the previous three studies delivered instruction to students on an individual basis, the last study, conducted by Hirschman (2000), investigated the effects of teaching a syntactic intervention to 63 students with LD in four different classrooms. The third- and fourth-graders that comprised the experimental group were tested on their ability to comprehend subordinate clauses (i.e., words that give additional information about the main clause). These data were compared to the performance of 33 students with LD in four control classrooms. All the participants attended state-funded remedial schools for students with LD. The students in the four experimental groups received classroom instruction in identifying grammar structures (e.g., verbs, nouns, pronouns, and subordinate clauses), comparing simple to complex sentences, and combining sentences. Treatment consisted of 55 sessions, and three of the four experimental

groups showed significant gains in their comprehension when compared to the control groups as measured by an oral or written retelling of a story.

In summary, the distinction between BICS and CALP mirrors the development of reading comprehension skills. Readers need both phonological processing (i.e., word level) and non-phonological (i.e., vocabulary, text-level processing, and syntax) language skills to understand content area textbooks. According to Cummins (1980), English language proficiency and cognitive ability intersect to form CALP, and together, these academic language skills positively affect educational performance. Conversely, students who lack academic language proficiency may manifest reading comprehension problems. Although research has established that teaching vocabulary and text-level processing leads to reading comprehension outcomes, studies investigating the relationship between instruction in syntax and comprehension remain scarce. However, existing studies examining the effects of teaching grammar structures on reading comprehension showed promise. Teaching poor comprehenders CALP skills, which include syntactic knowledge, may improve their ability to understand social studies, science, and English language arts texts (Fang et al., 2006; Schleppegrell, 2001).

A Review of the Text Structures of Content Area Discourse

Language skills include both expressive (i.e., speaking and writing) and receptive (i.e., listening and reading) language abilities, and the academic discourse that students read and write varies across content areas and difficulty levels. According to Chall, Bissex, Conard, and Harris-Sharples (1996), complex vocabulary and syntactic structures appear more frequently in difficult texts. These researchers conducted a study that explored the readability of texts using a qualitative method of assessment. The results of this study informed the development of six scales that assess the difficulty level of English language arts (i.e., literature and popular fiction),

science (i.e., life and physical systems), and social studies (i.e., narrative and expository structures) texts. Tests of the scales showed adequate interrater reliability and discriminant validity when compared to readability formula and reading comprehension test scores. This seminal work, which validated the scales for widespread use, marked the beginning of text analysis from a language perspective and highlighted the difference between content area texts, as well as academic versus everyday discourse.

More recently, technological advances have helped language experts efficiently analyze academic text. For example, researchers at the University of Memphis developed Coh-Metrix, an online computational program that examines how often language features appear in a text using 62 indices (Graesser, McNamara, Louwerse, & Cai, 2004). While not all of these indices are prevalent in content area texts, the Coh-Metrix categories offer an educator-friendly way of thinking about SFL by organizing indices into categories, which include: (a) semantic indices, (b) syntactic indices, and (d) situational model dimensions.

Academic discourse contains many semantic and syntactic features. Semantically, abstract content words require that readers have subject-matter knowledge. Coh-Metrix examines the average frequency of content words and analyzes a passage for its concreteness (e.g., how easily a word conjures up a mental image) and semantic relations, which emerge as the constituents or words occur across adjacent sentences and paragraphs to form common themes. These nouns, adverbs, adjectives, and verbs tend to be embedded in complex syntactic structures (University of Memphis Department of Psychology, 2006). The syntactic elements that Coh-Metrix examines include nominalizations (e.g., those two splendid old electric trains), verb phrases (e.g., has not been working), and pronouns (Halliday & Matthiessen, 2004).

In addition to semantics and syntax, Coh-Metrix also analyzes the situational model (i.e., the reader's mental representation) of a text. Although grammar structures usually help the reader construct an idea of what a text is about, the situational model varies by genre. The four types of situational models are (a) causal relations, (b) temporal relations, (c) intentional relations, and (d) spatial relations. Text with causal relations contains items like connectives (e.g., *meant that, in addition, because, in fact*) and logical operators (e.g., *and, not, if, then*), which join clauses together to make sentences and paragraphs (University of Memphis Department of Psychology, 2006).

The other two situational models commonly associated with academic discourse (i.e., temporal and intentional relations) use connectives as well as verb tense to achieve text cohesion. In contrast to causal, temporal, and intentional relations, text with spatial content is frequently arranged by location words (i.e., prepositions or places) and uses concrete action verbs. Even though these elements appear throughout all academic genres, the content words within them differ by subject matter (Martin, 2009). Attention should be paid to the language patterns that occur within a particular content area, such as social studies, science, or English language arts. This review uses the Coh-Metrix categories to organize information gleaned from the nine studies that analyzed discourse patterns from an SFL approach.

Analyses of social studies discourse. Four studies in this review focused on social studies text. All of them presumed a causal situational model (Coffin, 2004, 2006; Martin, 2002; Schleppegrell, Achugar, & Oteiza, 2004). Coffin examined causality in a sample of 38 history texts written by middle and high school students, which were considered exemplars of successful writing at the secondary level. This researcher organized historical discourse into three categories: recording genres (e.g., biographical recounts and historical accounts), explaining

genres (factorial explanations and consequential explanations), and arguing genres (expositions, discussions, and challenges). Recording genres offer an account of past events whereas the purpose of the other two genres is to analyze. Since analysis typically involves more sophisticated language, Coffin tracked the average frequency of higher-level nominalizations, verb phrases, and conjunctions (i.e., a type of connective) showing cause, purpose, condition, and manner.

The main difference between the texts written by middle and high school authors was the occurrence of abstract nominalizations, which appeared significantly more often in high school discourse. Coffin (2004) attributed this finding to the fact that the functions of the texts varied. Middle school texts contained narrative accounts of historical figures, but high school discourse included expository, persuasive, and explanatory texts. Not only did the nominalizations help the writers maintain an objective stance, but they also contained a greater number of impact words (e.g., *gradual, to a certain extent, a contributor, long-term*), which causally connected two or more ideas.

In addition to finding more nominalizations in high school history texts, Coffin (2006) established the presence of causal connectives across historical discourse after extending her original research to include history textbooks and teachers' writing samples for a total of more than 1,000 texts. Historians use connectives in explanatory texts to describe the factors leading up to an event and the resulting consequences. Causal connectives also logically order the author's arguments in expositions and discussions. Coffin offered the following paragraph as an example of text with the causal connectives in italics:

> *One reason for* so much opposition to the war was the number of different groups of people concerned. *For example*, many people, like revolutionary socialists, thought the

> war was unjust *because* capitalists were profiting at the workers expense. This was *because* prices were increasing and wages were decreasing. People *also* felt no one had a right to send others to kill or be killed. There had already been many casualties *and* further loss of life was resisted. *In addition*, conscription was *opposed by* those who had family and personal problems, *such as* responsibility for dependents. *Other opposition* came *from* Irish-Australians *who supported* the Easter Rebellion, *which* had been suppressed by the British. (p. 68)

Schleppegrell et al. (2004) also studied the language of history textbooks as part of as a professional development project designed to support teachers of English language learners and students with poor literacy. The project, which took place over the course of three years, analyzed the history textbooks used by 79 teachers in their classrooms. Results showed that nominalizations and abstract verbs (e.g., *is, have, resent, included*) appeared frequently in historical discourse. Moreover, the researchers found that the texts were organized using connectives that showed temporal and causal relations.

These nominalizations, abstract verbs, and connectives present students who struggle with academic language with significant comprehension problems. As such, the researchers recommended directly teaching students how to analyze history texts. Explicit instruction in how to identify these grammar structures in the text would help students learn to unpack lexically dense discourse and construct meaning. Once students learn to make sense of history texts, the researchers theorized that they would better understand historical concepts and increase academic performance (Schleppegrell et al., 2004).

The analysis performed by Martin (2002) supported the above research findings by identifying both causal connectives and nominalizations as features common to history texts.

This researcher compiled information from several genre studies in what became known as the Sydney School and emphasized that these abstract grammar structures often contain double meanings. When authors draw their words from more than one genre, different text types get mixed together. For example, the following paragraph blends references to both money and fatality:

> Wars are costly exercises. They cause death and destruction and put resources to nonproductive uses, but they also promote industrial and economic change. This benefit does not mean that war is a good thing, but that it sometimes brings useful developments. (Martin, p. 106)

This pooling of words from two or more genres into a single text can confuse readers who struggle with language. That is, because the potential meaning has expanded to encompass two different possibilities, students need to make decisions about which meaning is the correct one (Martin, 2002). As a result, students who know how to construct meaning from the causal conjunctions and complex nominalizations present in historical discourse have an advantage over their peers who lack this familiarity (Coffin, 2006).

Analyses of science discourse. The following three studies show that scientific discourse also has a high incidence of nominalizations (Esquinca, 2007; Fang, 2005; Young & Nguyen, 2002). In a review of prevalent science text features, Fang emphasized that abstract nominal groups have multiple meanings. As a result, readers could interpret "the destruction of the Brazilian rainforest" to mean that individual people, woodcutting corporations, or natural disasters destroyed the trees. Scientists tend to unintentionally use ambiguous language and technical vocabulary to make their writing appear more objective (Fang; Young & Nguyen).

Of the four main science genres, procedures, procedural recounts, reports, and explanations, readers tend to demonstrate fewer comprehension problems with procedural texts (Esquinca, 2007; Schleppegrell, 2004). Esquinca analyzed 140 randomly selected student notebooks from fourth-grade science classrooms. After receiving instruction on circuits and pathways, these younger students wrote primarily procedural texts that showed concrete actions and chronological steps. Sentences used the intentional dimension to convey information about material processes. For example, "We connected the bulb to the battery" related an animate subject to its actions (Esquinca, p. 99). Furthermore, the students used temporal cohesion to recount a procedure:

> When we made a circuit and only the base or only the nub were touching the battery or wire, the bulb did not light. When we wrapped a wire around the base and had the nub touch a wire or the battery, the light bulb lit. (Esquinca, p. 85)

The fourth grader who wrote the previous sentences maintained a consistent verb tense, and temporal connectives linked the clauses together in a sequence.

In contrast to fourth-grade discourse, reports and explanations frequently contained passive voice constructions and causal connectives. Young and Nguyen (2002) compared two discourse samples taken from a twelfth-grade physics class. The following excerpts include both spoken and written discourse:

> Teacher talk—I'm looking at my eyeballs and I'm gonna see the top of my head, *so* I have to look up at an angle about that much.
>
> Textbook passage—That is *because* the light that enters your eye is entering in exactly the same manner, physically, as it would *if* there really were an object there. (Young & Nguyen, p. 362)

As indicated by the italicized words, both teacher talk and the textbook contained conjunctions that explicitly connected two ideas together. However, teacher talk frequently used first-person point of view whereas more verbs representing mental processes (e.g., *think, consider*) or state-of-being (e.g., *is, were, be, have*) appeared in the textbook.

Not only must older students use abstract verbs and temporal conjunctions in their writing, they must also use and comprehend more sophisticated language structures. Schleppegrell (2002) compared science reports written by three English language learner (ELL) college students to that of a native English speaker. All report writers were enrolled in an advanced chemical engineering course. The researcher found that the ELL students struggled with verb tense, passive voice, and conjunctions.

In conclusion, students must learn to make sense of abstract language because scientists use these grammar structures to logically and authoritatively convey information. Overall, science texts follow specific language patterns that require students to unpack nominalizations, use temporal and causal connectives, and write in the passive voice.

Analyses of English language arts discourse. According to the two studies that analyzed English language arts text (Christie, 2002; Swiderski, 2007), discourse becomes more abstract as children progress through the grade levels. Younger students write mostly narrative texts whereas middle and high school students must understand how literary critiques and opinionated texts are structured.

Christie (2002) analyzed seven student-authored texts (ages 6 through 16 years) across three genres (i.e., narratives, literary critiques, and opinionated texts) and found that the narrative texts followed a temporal sequence. The connectives joining ideas together included the element of time (e.g., *once upon a time, one day, every time, the next day*). Moreover, the narrative

written by a six year-old used simple nominal groups like *her child* and *the bear* (p. 49). In contrast, the 11-year-old began using nominalizations with more words (i.e., Timmy the clock, a little girl), and the 14-year-old authored more sophisticated phrases: *one cold, stormy night* and *a clear image of a tall, huge looking man* (Christie, pp. 53, 55). Therefore, students appear to develop more abstract language skills as they gain experience in organizing their narratives with temporal connectives.

Once students have learned to write narratives, English language arts teachers expect them to apply this knowledge to literary critiques. However, the grammar structures across narratives and literary critiques vary significantly. Whereas narrative grammar structures draw from spoken language, literary critiques follow a different format that emphasizes passive voice and metaphorical language (Christie, 2002). As can be seen in the two literary critiques that Christie analyzed, character descriptions require students to comprehend and produce increasingly abstract forms.

> Life is about growing up, learning new things, meeting different people, and the book *To Kill a Mockingbird* is about all of these. Many situations throughout the book show the children's reactions and emotions. Jem and Scout are the main characters in the story and being children, they view everything with a fresh and unprejudiced outlook. They are guided by the steady hand of their father – Atticus Finch, the local lawyer and distinguished member of the town's society. He helps them deal with life's blows, the good times and the bad. (p. 60)

This text, written by a 15-year-old, included complex nominalizations (i.e., *many situations throughout the book, distinguished member of the town's society*), passive verbs (i.e*., is, are,*

view), and abstract metaphors (i.e., *guided by the steady hand of their father, helps them deal with life's blows*).

In addition to the more abstract language of literary critiques, older students must learn to back up their arguments with evidence. Christie (2002) outlined the following opinionated text as an exemplar of this skill:

> Although the average Australian woman is size 12 to 14, we are constantly bombarded with the exaggerated and incorrect notion that teenagers should all aspire to be size 8 or 10 like the models filling the pages of fashion magazines. (p. 63)

More sophisticated connectives (i.e., *although*) and nominalizations that contain embedded nominal groups (i.e., the exaggerated and incorrect notion *that teenagers should all aspire to be size 8 or 10 like the models* [filling the pages of fashion magazines]). To show the complexity of the nominalization in the previous sentence, the second nominal group has been italicized and the third embedded nominal group was bracketed.

In addition to the more complex grammar structures Christie (2002) discovered in older students' writing, Swiderski (2007) noted that the situational model and connective types vary by genre, as well as author's age. For example, elementary and middle school writers often organize narrative text using temporal relations (i.e., *once upon a time, then*), whereas their persuasive essays tend to contain the word *so*, which shows causal relations (Swiderski). In contrast to the younger adolescents, after analyzing 156 high school students' persuasive essays, Swiderski found that this expository text contained more complex conjunctions (e.g., *however, not only, but also*).

Moreover, Swiderski (2007) explored the relationship between situational model knowledge and text cohesion. That is, she studied whether or not students who show good

reasoning skills in their persuasive essays had a better command of the causal dimension. She concluded that familiarity with the genre or context within which students wrote their essays led to higher reasoning abilities and proper use of connectives.

Summary. Because of the relationship between genre and corresponding connectives, students with experience in the temporal and causal dimensions may perform better academically than those students who lack familiarity with these dimensions. Elementary and middle school students encounter temporal relations in historical accounts and short stories, but they do not readily apply this knowledge to the science procedures and narrative text demands of high school (Christie, 2002; Coffin, 2004; Fang, 2005; Schleppegrell, 2001). Furthermore, adolescents in high school need to acquire facility with more sophisticated connectives because historical analyses, persuasive essays, as well as scientific reports and explanations tend to be arranged using causal conjunctions (see Figure 3). Therefore, the literacy demands of social studies, science, and English language arts make knowledge of situational models essential.

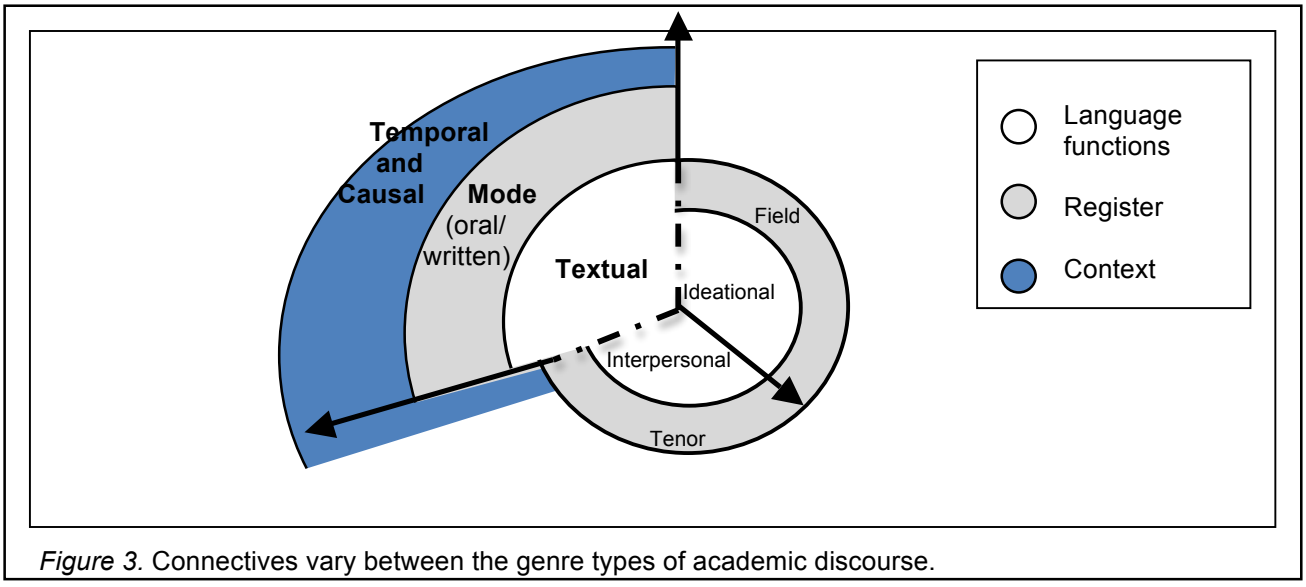

Figure 3. Connectives vary between the genre types of academic discourse.

Regardless of genre or content area, this review of the literature showed that nominalizations and passive voice demonstrated a large presence in academic texts (see Figure

4). The former language structures present struggling adolescent readers with significant challenges because they tend to be lexically dense and contain many content words. To comprehend subject-matter text, students must understand each individual word within the structure of a nominalization (Schleppegrell, 2001). Additionally, historians, scientists, and literary experts used passive voice to acquire distance from their writing and present themselves as a subject matter authority.

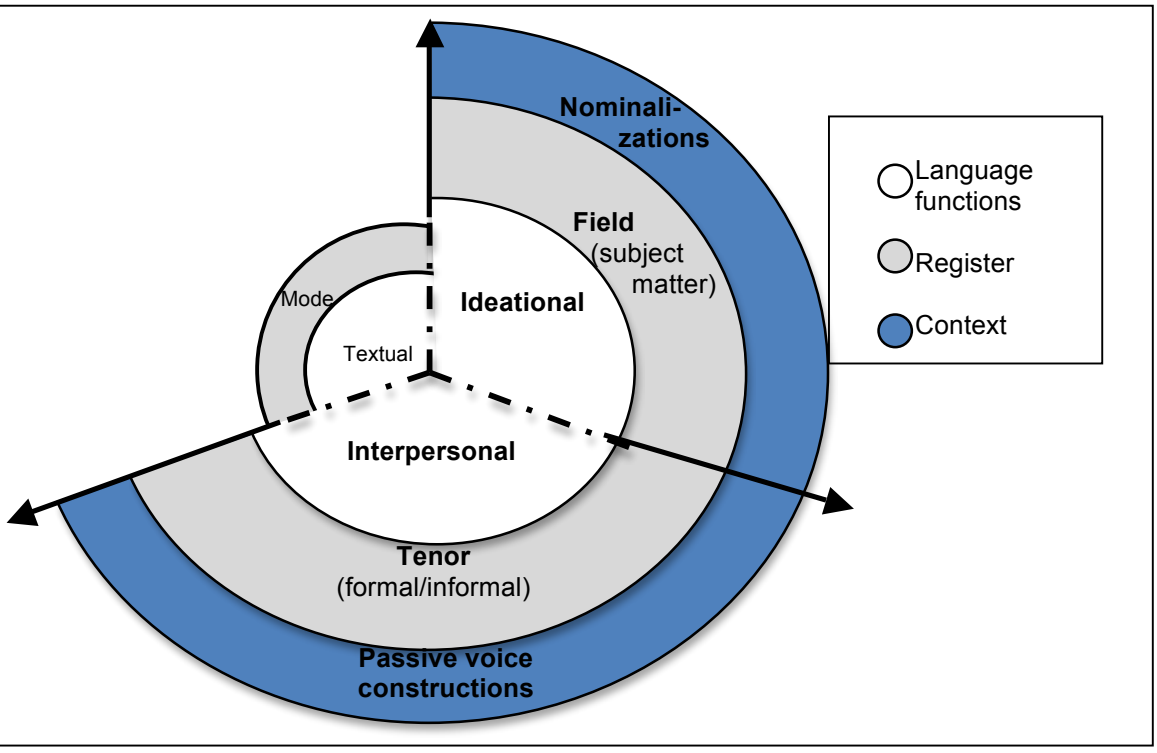

Figure 4. Nominalizations and passive voice appear across genres.

To adequately comprehend academic discourse, readers must know how to construct meaning from syntactic structures, including (a) nominalizations, (b) causal and temporal connectives joining phrases, and (c) passive voice constructions. The few studies that have examined the relationship between knowledge of grammar structures and reading comprehension (Ebbels & van der Lely, 2001; Ebbels et al., 2007; Hirschman, 2000; Levy & Friedmann, 2009)

found positive effects for teaching syntax. Given this link between syntactic knowledge and reading comprehension, an intervention that explicitly targets nominalizations, connectives, and passive voice seems warranted. However, a study exploring the effects of this intervention must adequately measure reading comprehension.

A Review of Reading Comprehension Measures

Before examining the relationship between non-phonological language components and reading measures, current trends in assessment and identification of students with LD will be outlined. The 2004 reauthorization of the Individuals with Disabilities Act (IDEA) included a provision for progress monitoring using a response-to-intervention (RTI) model. As a result, schools operating within an RTI framework seek to identify poor readers before they experience failure (Brozo, 2009; Duffy, 2007). Educators screen all students and deliver additional instruction to students who demonstrate reading difficulties. If students do not respond to progressively more intensive interventions, they eventually qualify for special education services (Fletcher & Vaughn, 2009; Fuchs & Fuchs, 2009).

Issues with reading measures. One of the primary tools used to assess students' reading skills and responsiveness to instruction is curriculum-based measurement (CBM). According to Fletcher and Vaughn (2009):

> Typically, a child reads a list of words or a short passage appropriate for his or her grade level (or does a set of math computations, spells words, etc.). The number of words (or math problems or spelling items) correctly read (or computed or spelled) is graphed over time and compared against grade-level benchmarks. (p. 32)

This reading measure counts the number of words correctly read, so CBM seems to detect phonological processing but not comprehension (i.e., non-phonological) issues.

Because comprehension and word recognition problems often co-occur, CBM likely identifies students with both word recognition and comprehension issues (Fletcher et al., 2001). This tool appears to have adequate sensitivity, which means that the probability of correctly identifying students with reading disabilities likely hovers around 80% (Stokes & Klee, 2009). However, the practice of using CBM alone may lack specificity (i.e., the probability of true negatives), since it may not correctly identify students with comprehension difficulties yet no decoding issues. Therefore, controversy surrounds the use of CBM as a sole measure to screen students for reading comprehension difficulties, monitor their progress over time, and determine their eligibility for special education services (Fletcher & Vaughn, 2009). Screening and progress monitoring tools need to reliably assess non-phonological language components that predict reading comprehension outcomes.

Researchers have acknowledged the issue of test validity, suggesting that reading comprehension measures assess a broad array of language processes (Snyder, Caccamise, & Wise, 2005). Snyder and colleagues encouraged the field to look beyond poor word recognition as a predictor of reading comprehension problems. Tests also need to include authentic measures that assess the reader's ability to construct meaning from vocabulary, genre-specific text structures, and grammar patterns (Snyder et al.). Therefore, to attain content validity, the authors recommend that evaluators use web-based assessments, such as the Measures of Academic Progress (MAP), which tailors questions to the students' reading level using their responses on multiple-choice items.

Fluency as a predictor of reading comprehension. In addition to multiple-choice test items, studies have examined the role that fluency plays with respect to reading proficiency

(Barth, Catts, & Anthony, 2009; Cutting & Scarborough, 2006; Rasinski et al., 2005). For instance, Rasinski and colleagues (2005) asserted:

> Cognitive attention or energy that must be applied to the low-level decoding task of reading is cognitive energy that is taken away from the more important task of comprehending the text. Hence, comprehension is negatively affected by a reader's lack of fluency. (p. 22)

These researchers tested 303 students' oral reading fluency using CBM and correlated the data with scores on a high school graduation test. They found that reading rate accounted for 28% of the variance in reading comprehension (Rasinski et al., 2005).

In addition to reducing cognitive load, fluent readers automatically recognize words in context. Barth and colleagues (2009) studied latent reading fluency variables by investigating the correlation between decoding, rapid automatized naming, language, memory, and nonverbal cognition using several standardized language measures. Language comprehension, naming speed, and decoding were found to account for a significant amount of the variance in the reading fluency of 527 eighth graders. The researchers concluded that readers who demonstrate fluency actively construct meaning as they interact with the text.

The last study was conducted by Cutting and Scarborough (2006). The researchers compared the reading performance of 97 students between the ages of 7.0 and 15.9 years using subtest scores from the Gates-MacGinitie Reading Test (G-M), the Gray Oral Reading Test—Third Edition (GORT-3), and the Wechsler Individual Achievement Test (WIAT) to determine the relative contributions of reading comprehension predictors. Reading speed accounted for additional variance over and above word recognition and oral language on the reading comprehension measures (Cutting & Scarborough). Given the results of these three studies

(Barth et al., 2009; Cutting & Scarborough, 2006; Rasinski et al., 2005), fluency measures may reliably measure reading comprehension and serve as adequate screening measures.

Screening measures of comprehension. Two screening tests that take little time to administer and allow for group administration include the Test of Silent Contextual Reading Fluency (TOSCRF; Hammill, Wiederholt, & Allen, 2006) and the maze procedure. The TOSCRF takes three minutes to administer in either an individual or a group setting, and the examiner's manual states that the test assesses word and grammar knowledge at the content level (Hammill et al., 2006). The test demonstrates adequate criterion validity (r = .70) when averaged across reading measures, such as the GORT, TOWRE, and the Stanford 9 total reading score. The authors addressed construct validity by calculating sensitivity and specificity, and with the exception of the TOWRE, the sensitivity for these reading measures remained below .80 (Hammill et al.). Researchers generally accept levels of 80% or above (Stokes & Klee, 2009), so the TOSCRF may demonstrate inadequate sensitivity when assessing reading comprehension.

An independent evaluation of the TOSCRF may help disentangle the different validity findings. To examine construct and criterion validity, researchers administered the TOSCRF along with other tests of reading fluency, decoding, and comprehension (i.e., the WJ-III, the Test of Silent Word Recognition Fluency, and the Test of Dyslexia: Rapid Assessment Profile) to 52 participants (Bell, McCallum, Kirk, Fuller, & McCane-Bowling, 2007). The TOSCRF significantly correlated with other measures of reading and demonstrated criterion validity. Furthermore, both measures of word recognition and fluency correlated significantly with the TOSCRF, but the relationship between this test and reading comprehension remained weaker (r = .39). Therefore, the authors concluded, "support is less strong for the notion that the TOSCRF

provides a robust measure of comprehension or that one could use it as a proxy for comprehension" (Bell et al., p. 45).

Because of its criterion validity, the TOSCRF will likely detect students with reading issues. Nevertheless, reading fluency findings showed that language comprehension accounted for different amounts of variance that ranged between 5 and 28%, so other factors may contribute to reading difficulties as well (Barth et al., 2009; Rasinski et al., 2005). Researchers operating from the construct of the Simple View of Reading (Hoover & Gough, 1990), which posits that two areas contribute to reading comprehension (i.e., word recognition and listening comprehension), generally want further data exploring the relative contribution of listening comprehension in addition to word level skills.

Therefore, use of another measure that correlates more highly with comprehension seems warranted. The maze procedure, a criterion-referenced test, consists of passages in which every seventh word is deleted. Students choose from three words (the correct word and two distracting words) by circling the one that best fits within the context of the sentence.

In a study of 236 middle school students, researchers found that the maze procedure better predicted reading growth over a three-month time period, as well as scores on the state reading test, when compared to words read correctly (Espin, Wallace, Lembke, Campbell, & Long, 2010). Even though the maze procedure appears to be a sensitive measure of reading comprehension, future research needs to investigate whether or not results on the maze correlate with vocabulary, text-level processing, and syntactic knowledge.

Summary. Reading comprehension measures present several challenges because they do not adequately measure non-phonological language components. However, schools adhering to an RTI framework need efficient and effective screening tools that reliably assess language

comprehension. Two measures that show promise include the TOSCRF and the maze procedure. In addition to these fluency measures, an authentic test that uses multiple-choice items to measure comprehension would provide valuable information to researchers developing interventions designed to improve reading comprehension.

Conclusions and Purpose

This literature review has explored how language skills, including vocabulary, text-level processing, and grammar knowledge, affect the reading achievement of struggling adolescent readers. When readers do not understand how to decipher the complex language patterns that appear in content area texts, they often struggle to meet academic setting demands. Studies examining the effects of teaching syntax to poor comprehenders showed positive results. However, researchers developing an intervention that targets grammar patterns need to attend to the language structures that appear within and across subject-matter texts.

After reviewing the literature on discourse patterns, the language structures present in academic texts emerged. The grammar patterns include nominalizations (i.e., noun phrases), causal and temporal connectives (i.e., conjunctions and transitions), and passive voice (i.e., sentences where the subject is acted upon). Explicitly teaching students to decipher these text structures may lead to better reading outcomes for adolescents with LD. However, assessing the efficacy of a reading intervention that targets the language structures in academic discourse requires the use of valid and reliable measures. In summary, although writers use language patterns to convey meaning across social studies, science, and English language arts texts, few studies have examined the relative contribution of grammar structure knowledge to reading comprehension.

Design-Based Research Sequence

The purpose of the design-based research study was to analyze prevalent grammatical structures in content area texts and determine if the comprehension of students who demonstrate below-average reading achievement improves when they receive instruction in an intervention that targets these structures. Specifically, the following research questions examined the relationship between explicit language pattern instruction and the reading comprehension of students with LD who demonstrate non-phonological language problems:

1. What grammar patterns appear within and across two different levels of social studies, science, and English language arts texts?
2. Does instruction in an iteratively designed intervention help struggling readers better understand academic discourse?

The intervention was developed using a formative design-based research approach (Plomp & Nieveen, 2009). The salient characteristic of design-based research methodology involves an iterative process (Reinking & Bradley, 2008). As noted by Plomp and Nieveen, the iterative process requires a three-pronged approach to design that focuses on improving an intervention through a series of intentional phases: (a) the preliminary phase, (b) the prototype phase, and (c) the pilot phase. In the preliminary phase, the essential components involved in teaching students with language issues how to understand syntactic structures commonly present in academic texts were explored. The prototype phase included multiple efforts to develop, implement, and redesign the intervention. The pilot phase evaluated the practicality and effectiveness of the intervention. During the design-based research process, the researcher kept a notebook documenting the changes made to the successive iterations.

Preliminary Phase

In the first phase, the researcher compared discourse within and across grade levels and core content areas using Coh-Metrix (University of Memphis Department of Psychology, 2006), an online computational program that measures the incidence of language features in text excerpts. According to Kelly (2004), design-based research serves to address the specific problems that arise in local contexts, so the purpose of this phase was to establish that the grammar structures in social studies, science, and English language arts discourse varied in a manner similar to what has been reported in the literature (Coffin, 2004; 2006; Esquinca, 2007; Fang, 2005; Martin, 2002; Schleppegrell et al., 2004; Young & Nguyen, 2002). Thus, both the current literature on successful reading comprehension programs and a local textbook analysis informed the development of the intervention.

Materials. Since biology and world history are taught in middle and high schools across the United States, an attempt to obtain the three most widely used texts for these content areas was made. Efforts to obtain textbooks from national publishing companies were unsuccessful. Instead, educational staff from six school districts in the states of Kansas and Minnesota were contacted, and text samples from the appropriate grade levels and content areas were requested. These school districts ranged in size from 11,374 to 39,298 students, with between 25% and 73% of the students receiving free and reduced-price lunch.

Procedures and instruments. District contacts located textbooks and carried out the following five steps to obtain suitable text samples: (a) determine the number of pages in the textbook, excluding the index and table of contents, (b) divide the number of pages by three to determine the page number that is two-thirds of the way into the book, (c) turn to page number calculated in the previous step – if that page consisted of more than 50% graphics or a chapter

review turn the pages forward in the book until a page containing at least three consecutive paragraphs of print without bullets or numbering is found, (e) photocopy or scan that page, as well as the immediately preceding and following pages, and (f) send the pages to the researcher via email, fax, or U.S. mail. A total of 16 text samples were received.

Excerpts from the textbooks consisting of between 504 and 510 words were entered into Coh-Metrix (University of Memphis Department of Psychology, 2006) and analyzed. Coh-Metrix measures provide a more sensitive assessment of text difficulty than traditional readability formulas (Graesser et al., 2004). McNamara, a researcher at the University of Memphis, and her colleagues designed the program to analyze text cohesion using methods that have been validated by computational linguists and discourse analysts (University of Memphis Department of Psychology, 2006). Once up to 15,000 characters have been entered into the online text field, Coh-Metrix calculates incidence scores for constituents (i.e., noun phrases), connectives (i.e., temporal, causal, and additive), and logical operators (i.e., *and, or, not, if, then*). A two-way analysis of variance (ANOVA) was used to compare grammar structures between texts from different grade levels and content areas.

Data analysis. The mean differences across two grade levels and three content areas were compared. The outcome variables consisted of the following syntactic indices: positive additive connectives incidence score, positive temporal connectives incidence score, positive causal connectives incidence score, negative additive connectives incidence score, negative temporal connectives incidence score, negative causal connectives incidence score, logical operator incidence score, Flesch-Kincaid (Kincaid, Fishburne, Rogers, & Chissom, 1975) grade level, noun phrase incidence per 1,000 words, mean number of modifiers per noun phrase, mean number of higher-level constituents per word, mean number of words before the main verb of the

main clause in the sentence, positive logical connectives incidence score, and negative logical connectives incidence score.

The mean differences between the various texts were explored to see if within-group differences existed for nominalizations across all content areas and if the types of connectives varied across disciplines. Nominalizations and connectives were targeted because the studies in the literature review (e.g., Christie, 2002; Coffin, 2004; Fang, 2005; Schleppegrell, 2001) found that these language patterns presented students with the most difficulty. Cohen's *d* calculations were performed to identify indices that demonstrated large effect sizes (i.e., greater than .80), which indicated that these language patterns significantly differed between grade level and content area (Cohen, 1992).

Results. When compared to middle school, high school texts demonstrated significantly higher reading difficulty scores. A comparison of Flesch-Kincaid grade-level scores determined a large difference between middle and high school texts ($d = .931$). However, readability scores only provide a general measure. This analysis included more specific information about the language patterns that appeared in high school versus middle school textbooks, and effect sizes were calculated using the mean difference scores for each language structure and the mean square error (see Appendix C for means and effect sizes tables).

A comparison of middle school- and high school-level discourse showed several patterns. The mean number of higher-level constituents per word ($d = 1.142$) demonstrated a large effect size. This mean difference showed that the high school texts contained nominalizations with language elements that extensively described the main subject (University of Memphis Department of Psychology, 2006). Additionally, these lexically dense sentences have embedded clauses that require readers to unpack each phrase in order to comprehend the discourse.

Not only do syntactically complex phrases appear more frequently in high school texts, certain types of connectives also demonstrated a larger presence in these texts. In particular, large effect sizes for positive logical (d = 1.239), causal (d = 0.860), and temporal (d = 0.939) connectives were found. Positive connectives help writers elaborate on situations or events in a cohesive manner so that academic text flows logically (University of Memphis Department of Psychology, 2006). Therefore, knowledge of embedded nominalizations and the positive connectives that join them together should help adolescent readers successfully decipher the language patterns in academic text.

The literature (e.g., Fang et al., 2006; Schleppegrell, 2001) has suggested that older adolescents need to understand how to unpack lexically dense grammatical structures in each content area. The current analysis found that language patterns do, indeed, vary across disciplines. For example, world history texts in both middle and high school settings contained significantly more noun phrases (d = 1.772), logical operators (d = .868), and positive additive connectives (d = 1.763) than did biology discourse. Furthermore, English language arts texts had fewer noun phrases (d = 2.490), words before the main verb (d = 2.138), and positive additive connectives (d = 1.351) than history texts. Because logical operators and noun phrases make texts difficult to read, struggling readers may encounter comprehension problems with social studies discourse containing these language elements.

While Systemic Functional Linguistics (SFL) researchers emphasized the causal dimension of social studies texts (e.g., Coffin, 2004; Schleppegrell et al., 2004), this analysis found that significantly more positive causal connectives appear in science texts (d = 1.208). In contrast, more negative causal connectives seem to be embedded into world history texts (d = .747). Even though the effect size for causal connectives in biology is twice as large as in

history, this analysis only compared 12 science and social studies texts, a decidedly small sample. Therefore, these results must be interpreted with caution. Knowledge of the causal dimension may help students decipher both history and science texts.

The biology texts also demonstrated highly dense grammatical structures, which adolescent readers struggle to understand. That is, significantly more words before the main verb in sentences (d = 2.254), positive logical connectives (d = .871), and positive causal connectives (d = 1.301) appeared in science texts when compared to English language arts discourse. As a result, authors of biology texts use connectives to describe procedures logically and explain causes for scientific phenomena (Rose, 2007). Readers who struggle to decipher these language structures experience large working memory loads, which reduce the resources available for constructing meaning from the text.

Not only do biology texts tax the working memory of struggling readers, English language arts discourse also presents them with a challenging cognitive load. These texts contain more higher-level constituents per word (d = 1.066), and negative logical (d = .797) and additive (d = .842) connectives than history books. Furthermore, the English language arts texts demonstrated a higher incidence of logical operators (d = .954) and negative causal connectives (d = .744) than biology discourse. Therefore, adolescents need to learn how to comprehend structurally dense sentences with negative relations so that they understand English language arts texts.

Overall, high school readers must process the higher-level constituents and modifiers that commonly appear in embedded clauses to comprehend academic text. To comprehend written discourse, readers need to have knowledge about causal relations because causal connectives demonstrated a large presence across history, biology, and English language arts texts. History

texts contained decidedly more nominalizations and positive additive connectives than biology or English language arts texts. However, significantly more positive causal connectives and words before the main verb of the sentence appeared in biology texts when compared to the other content areas. Finally, English language arts texts had more negative connectives than history or biology, so knowledge of how to structure sentences using words like *but, until*, and *although* would help poor comprehenders better understand the text. Explicitly teaching students with learning disabilities (LD) how to unpack sentences with complex nominalizations, as well as positive and negative logical, causal, and additive connectives, may boost their comprehension. These data were used to guide the design and development of the language intervention used in this study.

Intervention development. The findings from the Coh-Metrix (University of Memphis Department of Psychology, 2006) textbook analysis provided information to guide the design of an instructional protocol for teaching grammar structures. After a review of the literature and Coh-Metrix analysis, a preliminary outline of the instructional protocol was developed. The initial draft followed an instructional sequence that has been validated by researchers at the University of Kansas Center for Research on Learning (KU-CRL) over the last 30 years (Schumaker & Deshler, 2006). This methodology incorporates teacher modeling, scaffolded levels of practice, targeted feedback, and generalization into instructional stages that explicitly teach a strategy to students and help them become independent learners (Schumaker & Deshler, 2009).

Prototype Phase

The purpose of the prototype was to develop and refine an intervention designed to explicitly teach students text patterns. Concrete implementation procedures were written down

and compiled into a manual so that the intervention could be replicated across settings without significant researcher input. Experienced teachers also reviewed this prototype and offered suggestions about how to make the intervention more palatable and user-friendly.

Materials. The tools developed in the prototype phase assisted in measuring fidelity of implementation and checking student progress during the pilot and validation phases. Observation checklists (see Appendix D and E) were developed using existing resources as a guide (i.e., Cornett, 2009; Graner, n.d.). These checklists included measureable behaviors that assessed whether or not the essential components of the intervention had been implemented.

To assess the effects of the intervention on students' reading comprehension, maze procedures were developed, which are passages in which every seventh word was deleted. This assessment required the students to circle one of three words (the correct answer and two distractors) within expository social studies and science passages. The Flesch-Kincaid readability scale rated these 400 word passages at the eighth-, ninth-, and tenth-grade difficulty level. Because researchers found that performance on maze procedures predict reading comprehension for eighth graders (Espin et al., 2010), it was assumed that this procedure would evaluate student knowledge about the language that they encounter in academic texts. On this measure, students practice identifying morphosyntactic structures (i.e., patterns of word and sentence formations) and complex terminology within academic discourse. As students master easier texts, the difficulty level of the passages gradually increases.

Procedures. In addition to developing assessment measures, four professional educators with at least 25 years of experience in teaching language arts and/or reading were asked to review and provide constructive criticism about the scope and sequence of the intervention. In particular, one speech-language pathologist suggested incorporating a more explicit

metalinguistic approach to teaching language patterns (e.g., offer students a scenario and specific words to use when practicing reading, writing, listening, and speaking tasks).

Upon completion of the final iteration, further input was sought from a group of experts in the area of strategy instruction. The KU-CRL has a long history of developing learning strategies, instructional routines, and teaching supports and disseminating them through a network of more than 1,000 certified professional developers, who teach educators how to implement these interventions with fidelity (Deshler & Schumaker, 2005). Because the members of this network have previously taught an array of KU-CRL designed interventions to students with learning disabilities (LD), and the intervention was developed for teaching language patterns to students with LD, they were deemed to have unique insights to offer about the intervention. Each summer, the KU-CRL holds an international conference to update and elicit feedback from the professional developers about various projects and initiatives. The intervention was presented at the 2010 conference where approximately 30 professional developers reviewed the draft and provided specific feedback about the feasibility and palatability of implementing the intervention.

Input from participants at this conference was also sought on the content of the intervention. This input was instrumental in informing new iterations of the intervention. The specific suggestions made by the professional developers included (a) classifying the five verb types as active or passive voice, (b) having students describe how connectives show the relationship between ideas, and (c) adding a generalization activity where the students identify language elements in their content area textbooks. As a result, the final version used in the efficacy study placed more emphasis on the process of teaching language patterns.

Intervention design. An intervention was developed that explicitly addressed nominalizations, connectives, and passive voice, informal reading comprehension measures were explored to see if they demonstrated sensitivity (i.e., did they detect student knowledge of text patterns), and input from teachers and language specialists was sought about the intervention.

Poor comprehenders have difficulty deciphering complex grammar patterns, and according to Schleppegrell (2004), they struggle because:

> For many children, schooling presents a new situation, new ways of interacting, and new types of texts, as they are expected to read and write genres that construe new kinds of disciplinary knowledge. As they write, the lexical and grammatical choices they make, clause by clause, simultaneously construe social relationships and experience of the world. (p. 3)

As such, this intervention was designed to explicitly teach students how to apply their knowledge of spoken language to written discourse. Since both the literature and the findings in the preliminary phase of this study suggested that students frequently encounter complex language structures in their textbooks, the intervention showed students how to structure noun phrases and join them together using logical relations and conjunctions. The goal of the intervention was to teach adolescents how to approach lexically dense text in an efficient and effective manner.

Deconstructing verb types and noun phrases. To understand nominalizations, students must first learn how authors use language to convey their experiences. Often, academic writers transform concrete activities into abstract noun phrases that differ from spoken language patterns (Martin & Rose, 2007b; Schleppegrell, 2004). These grammar structures turn a verb (e.g., to *violate*) into a noun (e.g., *violation*). Therefore, the intervention started out by teaching students

to distinguish between active verbs (i.e., doing, saying, and thinking) and verbs used in passive voice constructions (i.e., linking and helping).

In addition, the intervention explicitly addressed how writers construct noun phrases. These complex grammatical structures contained several language components (Martin & Rose, 2007b), such as deictics, numeratives, epithets, classifiers, things, and qualifiers (e.g., this first such gross violation of human rights). The researcher developed a chart (see Figure 5) to use in the intervention, which guided the students as they constructed noun phrases.

Identifier	Ordering Word	Describing Word	Main subject	Prepositional Phrase
a	single	harsh	punishment	from the court
the	other	big	relationship	in his life
the	only	tired	runner	in the race
the	two	long	applications	for jobs
a	lone	angry	fighter	on our side

Figure 5. Noun phrase chart.

Forming grammatical metaphors. After the students who learned the intervention gained experience with identifying verb types and structuring noun phrases, they applied this knowledge to what SFL researchers call *grammatical metaphors* (Halliday & Matthiessen, 2004). This interplay between semantics and grammar structures allows authors to express multiple meanings in one clause (Schleppegrell, 2004). Struggling readers frequently lack familiarity with these uncommon language patterns, which negatively impacts their comprehension (Martin & Rose, 2007b). As such, the intervention taught students how to link clauses together.

Since the Coh-Metrix (University of Memphis Department of Psychology, 2006) analyses found that positive logical, additive, temporal, causal, and negative relations frequently appeared in content-area texts, the intervention targeted instruction around the use of connectives. More specifically, students learned how to join clauses together with conjunctions, including temporal and causal connectives. Whereas conjunctions join two clauses together within a sentence (in this intervention), transitions introduce new information that relates to previously stated ideas (Martin & Rose, 2007b). This intervention assigned specific symbols (e.g., ⊕ and ↗) to each type of connective and to positive (+) and negative (−) relations so that students associated graphics with the concepts that they represented. The researcher developed the following chart (see Figure 6) to explicitly teach connectives within the context of the intervention.

Identifying thematic text structure. Not only did the intervention teach students to apply their language knowledge at the clause and sentence level, but scaffolded practice analyzing sections of academic text was also supported. The intervention addressed the concepts of presenting (i.e., introducing) and presuming (i.e., tracking). Authors use indefinite determiners (i.e., *a, an, some*) to introduce main subjects to the reader. However, definite determiners (i.e., *the, this, that*) and pronouns (i.e., *he, we, they*) allow authors to succinctly refer back to concepts. These text references make room for the introduction of more new information (Martin & Rose, 2007b). Although good readers automatically understand how identifiers work, teachers must explicitly demonstrate this process to students with language difficulties, so they develop the tools necessary to access academic text.

Students who learned this intervention first practiced recognizing and making meaning from noun phrases, connectives, and passive voice at the sentence level, and then they applied

their knowledge to longer passages of discourse including paragraphs and textbook sections. Toward the end of the intervention, students practiced identifying and constructing meaning from noun phrases and conjunctions in content area texts written at their reading level. As they mastered easier discourse, the text difficulty gradually increased. The researcher compiled scaffolded readings in social studies, science, and English language arts (see Appendix F). These texts are part of the intervention package because the ultimate goal is to help adolescents with LD read texts written at their grade level and more readily access the general education curriculum.

Level I		**Level II**	
Temporal	**Causal**	**Additive ±**	**Comparison ⇆**
Conjunctions after already as soon as before now that once then since still until when while Transitions At last, At once, At the same time, Finally, First, Meanwhile, Next, Now, Previously, Recently, Subsequently,	Conjunctions + as +as long as + because + by + in order to + since + so + so that − although − but − even though − unless Transitions + As a result, + Consequently, + In conclusion, + Therefore, + Thus, − Admittedly, − However, − Nevertheless, − Nonetheless,	Conjunctions + also + and + as well as + besides + just as + provided that + too − but − nor Transitions + Another + Furthermore, + In addition, + In fact, + In summary, + Indeed, + Moreover, − However, − Nevertheless, − Nonetheless,	Conjunctions + actually + again + although + as if + either—or + even if + if + like − except − instead − neither—nor − rather than − unless − whereas Transitions + For example, + In fact, + On the one hand, + Similarly, + That is, − Alternatively, − Conversely, − If not,—then − In contrast, − On the other hand,

Figure 6. Connectives chart.

Pilot Phase

The pilot study involved a micro-evaluation to further assess the feasibility and outcomes of classroom use (Plomp & Nieveen, 2009). This four-week study took place during a summer school session for students formally identified as having a learning disability. The intervention was taught to nine students, iterative changes to the intervention and reading comprehension measure were made, and student progress before and after implementation was assessed.

To obtain the students' level of reading comprehension before and after four weeks of instruction, the Test of Silent Contextual Reading Fluency (TOSCRF; Hammill et al., 2006) and a maze procedure were administered. These data tested the hypothesis that instruction in deciphering text structures leads to reading comprehension gains. The students also completed weekly maze procedures that consisted of 400 word passages at the eighth-grade level and between 50 and 55 multiple-choice items. These measures were also used in the validation study to examine how instruction in the intervention affected language comprehension.

Improving ease of implementation. Throughout implementation of the pilot study, interactive, metalinguistic exercises were added to the lessons. These activities presented abstract language concepts in concrete ways that facilitated student understanding. Insights from this pilot study helped in compiling a more detailed manual, which provides implementing teachers with instructional procedures and materials and fidelity checklists consisting of critical teaching behaviors. Teachers who implemented the intervention also received specific guidelines showing them how scaffold student learning with instructional activities, multiple practice opportunities, explicit modeling, and targeted feedback.

Adapting the maze. During the pilot phase, maze procedures were used to assess changes in student understanding of academic text. Given three choices, the students circled the

correct word between 50 and 55 times. Although the students completed new mazes each week, their performance on this measure showed relatively little change over the course of the four weeks, and they demonstrated less accuracy when completing the second half of the task. However, not all of the choices within these 400-word passages required students to decipher the targeted language features, so this lack of growth may have to do with the sensitivity of the probes.

As a result, the maze procedure was adapted to include identifiers, noun phrases, connectives, and passive voice, and the passages were shortened to 200 words. A panel of five reading experts, each with at least 10 years of experience in education research, practice, and policy, reviewed the measures to ensure the quality of the distractor items. The panel noted the number (i.e., 1-25) of multiple-choice items within each of the six probes that they judged to be of equal difficulty, and then made a list of the items that were too easy or difficult. Finally, panel members provided a rationale for how the items differed compared to the other items within the probe. The panel's ratings were compiled and an item-by-item comparison was used to generate the modified mazes.

Assessing the intervention. In addition to the maze procedures, the students involved in the pilot study completed the Test of Silent Contextual Reading Fluency (TOSCRF; Hammill et al., 2006) before and after receiving instruction in the intervention. These students, who ranged in age from 10 to 14 years, gained an average of 16 raw score points from pretest to posttest. The TOSCRF examiner manual (Hammill et al., 2006) was used to convert these data into standard scores (see Figure 7). Overall, the students showed an increase in reading fluency once they learned the Text Pattern Intervention.

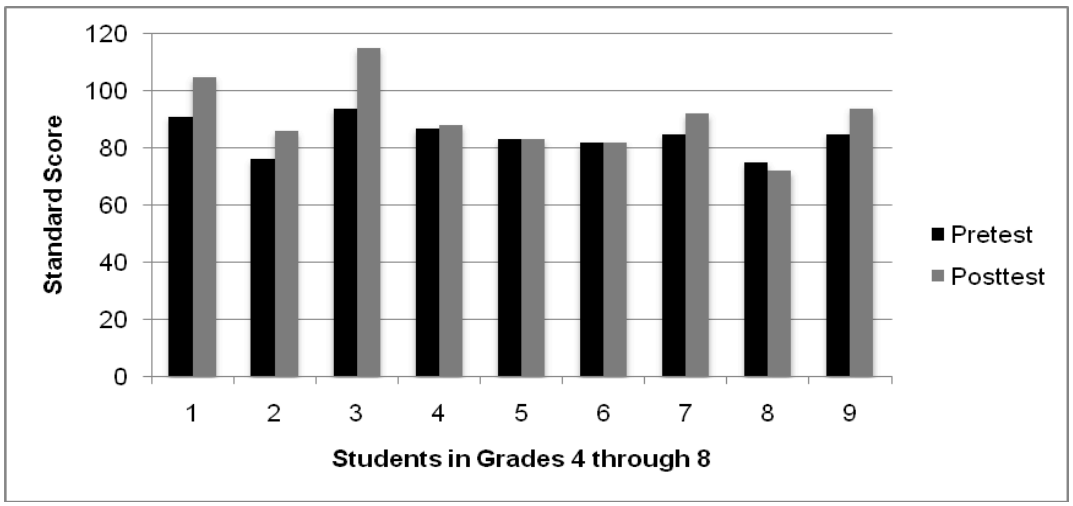

Figure 7. Pilot data.

Conclusions and Purpose

A review of the literature revealed only one efficacy study that examined the relationship between teaching syntax in a classroom setting and reading comprehension. The purpose of this research study was to determine if the comprehension of students who demonstrate below-average reading achievement improves when they receive instruction in an intervention that targets grammar structures, including passive voice, nominalizations, and connectives. Specifically, the following research questions examined the effects of text pattern instruction on the reading comprehension of students who demonstrate non-phonological language problems:

1. Are teachers able to implement a language pattern intervention with fidelity in a classroom setting given ongoing instructional coaching?
2. Is the Text Pattern Intervention effective in improving reading comprehension when compared to other instructional methods?
3. Is explicit instruction in language patterns feasible and palatable within a classroom setting?

CHAPTER III

METHODS

The intervention examined in this study was designed to teach students how to identify and understand language patterns in content area text. The study took place in three separate districts in three different states in the Midwest. Data were collected from three experimental classrooms and three comparison classrooms.

Participants

Teacher participants. The researcher recruited three teachers who had expressed an interest in improving reading outcomes for high school students. Teacher A and Teacher B were high school special educators, whereas Teacher C was a general educator of English language arts who taught several sections of a class designed to improve the reading and writing skills of students who had yet to pass the state assessment. The size of the classes taught by each of these teachers was relatively small (i.e., range of 5 to 13 students, $M = 8.167$, $SD = 3.488$). All three teachers had more than 16 years of teaching experience and each held master's degrees in their field of certification.

Each of the three teachers instructed at least two classes for a total of six classes (see Table 1). Since these classes were already intact, the researcher designated one class as the experimental group and the other as the comparison group. Thus, each teacher taught an experimental and a comparison class. The teachers delivered instruction as planned in the comparison classes, but the students in the experimental classes received instruction in the language intervention.

Table 1

Number of Students in the Comparison and Experimental Classes

Teacher	Comparison	Experimental	Total
A	5	5	10
B	13	12	25
C	7	7	14
Total	25	24	49

Note. The number of students in the comparison and experimental classes for two of the teachers ended up equal by chance.

Student participants. All of the ninth, tenth, eleventh, and twelfth graders enrolled in these six classes were invited to participate in the study, for a total of 52 students. By the end of the study, there was an attrition of three students. Every student in the experimental classes received instruction in the language intervention, but only the data for the students who returned signed consent forms were used in the analysis. Of the students who attended Teacher A's school, 46.8% were eligible for free or reduced-price lunch, and 10.21% received special education services. Teacher B's district reported that 88% of the students at this school received free and reduced-cost lunch, and 13% received special education services. Finally, Teacher C's district classified 25.56% of the students at this school as economically disadvantaged and reported that 15.23% received special education services.

The Oral and Written Language Scales; OWLS; Carrow-Woolfolk, 1996; written language scale) was administered in a group setting to determine which students in the classes taught by Teacher A, B, and C demonstrated below average written language skills. This test provided information about the students' ability to write using appropriate language conventions, syntactic structures, and logically ordered discourse. On this group-administered measure, the

examiner read 15 prompts aloud to the students who provided written responses. Each item was scored using the rules set out in the OWLS manual; accordingly, participants received points for the following categories: spelling, capitalization/punctuation, conventional structures, verb forms/sentences, complex sentences, meaningful content, details, coherence, supporting ideas, word choice, and unity. On this measure, 52 participants scored at or below a Standard Score of 92 (M = 81.429, SD = 7.139), a score that placed these students' language performance as -0.5 below the mean or lower. Results also showed that the comparison group (M = 83.480, SD = 6.226) significantly outperformed the experimental group (M = 79.292, SD = 7.521) on the OWLS, $t(47) = 2.127$, $p = .039$.

The participants completed another norm-referenced measure (the Test of Silent Contextual Reading Fluency; TOSCRF; Hammill et al., 2006) and two criterion-referenced measures (i.e., maze procedure and content area passage questions). The scores of the comparison and experimental groups were compared using t-tests, which determined that no significant mean differences existed between the two groups on the three measures, $t(47) = .088$, $p = .930$; $t(47) = 1.277$, $p = ..208$; and $t(47) = .078$, $p = .938$ (see Table 2 for means and standard

Table 2

Pretest Means and Standard Deviations

Test	Comparison		Experimental	
	Mean	*SD*	*Mean*	*SD*
TOSCRF	78.840	8.975	78.625	8.069
Maze	72.080	10.116	68.292	10.650
Content area passage	18.600	8.529	18.417	7.813

deviations). As stated above, out of the original group of 52, 49 students remained in the study to the end. This sample size met the criteria for adequate power, as researchers in the behavioral sciences generally view a power of .80 or above as acceptable (Cohen, 1992). Given a compromise power analysis conducted using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007), a total sample size of 49 participants yielded a power of $1-\beta = .91$ when detecting what Cohen (1992) defined as a medium effect size of at least .50.

Teachers A, B, and C reported demographic information (see Table 3) describing the participants' disability, grade level, and ethnicity. A total of 10 students in Teacher A's classes participated in the study. The five students in the experimental group and the five students in the comparison group each had active IEPs. Teacher B's classes were also designed to provide special education intervention to students with reading needs, and each of the 12 participants in the experimental group and 13 participants in the comparison group had active IEPs. In Teacher C's classes, three of the seven participants in the experimental group qualified as having LD, whereas two of the seven participants in the comparison group had an LD designation.

Setting

Four of the six classes were in special education classrooms in two different urban settings. School district A reported a population of 18,288 students and utilized a block schedule in its high schools. Thus, the 1,562 students at the first school attended classes that occurred on alternating days; a class would meet on Monday, Wednesday, and Friday during one week, and the next week, the same class would meet on Tuesday and Thursday for a total of five class sessions every two weeks. School district B served approximately 38,500 students, with 2,072 students in the targeted high school. The students at School B followed a traditional schedule, whereby all seven of their classes met on a daily basis. The two participating classes in

Table 3

Demographic Data for Student Participants in Experimental and Comparison Classes

	Experimental Group			Comparison Group		
Teacher	A	B	C	A	B	C
			Grade			
Ninth	3	4	0	0	3	0
Tenth	0	5	4	1	6	0
Eleventh	1	2	3	1	2	6
Twelfth	1	1	0	3	2	1
Total	5	12	7	5	13	7
			Disability			
Learning	3	9	3	5	11	2
Emotional/Behavioral	0	0	0	0	1	0
Mild/Moderate	0	0	0	0	0	0
Other (Autism or ADHD)	2	3	0	0	1	0
			Non-Native English Speakers			
	0	4	1	0	0	0
			Ethnicity			
American Indian	0	0	1	0	1	1
Asian	0	10	1	0	4	0
Black	2	1	1	1	0	5
Latino/a	0	1	1	0	2	0
White	3	0	3	4	6	1
Other	0	0	0	0	0	0

Note. ADHD = attention deficit hyperactivity disorder

School District C took place in a general education English classroom. This district had 11,158 students. The suburban high school of 1,064 students had a modified block schedule, whereby each of the six class periods met four times a week. Every classroom contained desks or tables with chairs, white boards, and an LCD projector.

The Text Pattern Intervention

The Text Pattern Intervention (previously referred to as "the language intervention") is an instructional approach designed to explicitly teach students how to interact with language as they engage in reading, writing, listening, and speaking tasks. The students in the experimental group learned this intervention, which incorporated elements of the research literature, namely: (a) the principles of reading comprehension instruction, including explicit modeling and scaffolded practice (e.g., Edmonds et al., 2009; Faggella-Luby & Deshler, 2008; Gersten et al., 2001; Martin & Rose, 2007b; Mastropieri et al., 2003; Swanson & Deshler, 2003; Swanson & Hoskyn, 2001); (b) targeted language instruction that uses content area discourse to increase students' knowledge of grammar conventions and vocabulary (e.g., Catts & Hogan, 2003; Nation, 2005; Rice et al., 2009; Schleppegrell, 2001; Scott & Balthazar, 2010); and (c) text pattern instruction, including teaching students to decipher noun phrases, connectives, and passive voice. Throughout the six lessons (see Figure 8), students deconstruct and reconstruct language patterns that commonly appear in content area text.

The first lesson involves a review of action verbs and starts out with words representing concrete physical movements that students typically encounter in narrative texts (e.g., *jump* and *grumble*). Even though most secondary students have already encountered *doing* and *saying* verbs in stories, they frequently do not apply this knowledge to content area texts, such as

Lesson	Concept	Purpose
1	Action Verbs	To teach students the difference between physical and mental activities and help develop variety in verb choice and usage
2	Linking and Helping Verbs	To teach students how to identify and use passive voice
3	Changing Verbs to Nouns	To teach students how to transform verbs into nouns
4	Noun Phrases	To teach students how to structure noun phrases
5	Temporal and Causal Connectives	To teach students how to connect phrases and show relationships between ideas
6	Identifying Text Structures	To teach students how to track ideas or themes in paragraphs

Figure 8. Intervention scope and sequence.

historical accounts, procedural recounts, and persuasive essays (Christie, 2002; Coffin, 2004; Fang, 2005; Schleppegrell, 2001). Following their work with verbs that represent concrete physical movements, the students work with more abstract *thinking* verbs (e.g., *watch* and *listen*) so that they develop familiarity with the words that commonly appear in expository texts (i.e., scientific explanations, literary critiques, and historical analyses).

Lesson two shifts the students' attention to passive verb formations, which scientists and historians often use in their writing (Fang, 2005). The students learn to choose and use both linking and helping verbs. This lesson helps students convey information in writing while maintaining the objective stance that portrays authority on the matter at hand. However, because some disciplines require that authors write in active voice, the students also practice translating passive into active voice sentences (American Psychological Association, 2009).

The next two lessons build on the students' knowledge of verbs in order to convert them into noun phrases. Lesson three introduces a list of suffixes that change words from verbs to nouns. Once the students have practiced using root words as verbs and nouns, they add identifiers (i.e., *a* and *the*) and adjectives to the left and prepositional phrases to the right of the main subject to form noun phrases. Finally, the teacher asks students to identify noun phrases in

their content area textbooks. This generalization activity helps the students apply their skills to new reading situations.

In addition to identifying noun phrases, secondary-level students also need to be able to recognize the relationships between phrases, clauses, and sentences in science, history, and English language arts discourse. Therefore, the last two lessons show students how to join phrases using temporal and causal connectives (i.e., conjunctions and transitions) and track previously introduced ideas or concepts. The lessons end with students using identifiers and connectives to discern the theme and important details of increasingly difficult social studies and science passages.

Instructional sequence. Each lesson builds on previous instruction so that students learn how to approach content area text in a scaffolded way as they proceed through an instructional sequence. The KU-CRL designed an instructional sequence, and over 30 years of research has shown that following these *stages of instruction* lead to improved outcomes for students at risk for academic failure (Schumaker & Deshler, 2009). Thus, the broad outline of the lessons within the intervention involved the following components and objectives:

- *Pretest*—to obtain a baseline measure of the students' present level of reading comprehension;
- *Describe*—to provide rationales for reading comprehension and deliver direct instruction on how to decipher text structures;
- *Model*—to show students the metacognitive processes involved in reading by thinking aloud;
- *Controlled Practice and Feedback*—to enable guided student practice in comprehending syntactic structures in texts written at their reading level;

- *Advanced Practice and Feedback*—to allow students to independently practice comprehending grammar structures in gradually more difficult texts;
- *Posttest*—to measure progress toward improved reading comprehension by comparing pre/posttest and posttest results; and
- *Generalization*—to promote student transfer of reading skills to novel situations.

Each of the lessons provided the students with direct and explicit teaching of important language components, as well as opportunities for practice and feedback.

Instructional materials. A protocol was written to ensure that participating teachers delivered instruction in a consistent manner across classrooms (Ihle, 2010). The manual included step-by-step detailed instructions about how to implement each lesson, cue cards to display as the teachers described the lessons, learning sheets to accompany each lesson, and an answer key providing specific information about how to score the learning sheets. The teachers also received a PowerPoint file that was created to guide implementation and minimize inconsistencies between participating teachers. This teaching tool directly referenced the pages to follow in the manual and included visual devices that the teachers used during instruction.

Professional development sequence. Before implementing the intervention, each teacher met one-on-one with the researcher for a two-hour professional development session. During this time, each lesson was reviewed by describing the teaching procedures, modeling hands-on language activities to use with the students, and studying the requirements of the learning sheets. Furthermore, the teachers read through and asked clarifying questions about the observation checklists. The purpose of this session was to help the teachers become familiar with the intervention.

Each intervention class was also attended or watched via video to check fidelity of

implementation. Moreover, additional modeling and teaching of the intervention was provided, as suggested by what was observed in person or in the videos during subsequent on-site visits. Because of the daily visits to two of the three classrooms, regular feedback was provided until the teachers mastered the specified instructional procedures.

Weekly coaching of the implementing instructors also took place throughout the duration of the study to ensure fidelity of implementation. This ongoing support followed a professional learning approach known as *instructional coaching* (IC; Knight, 2009). The model involves coaches collaborating with teachers as they work to embed research-based practices into the classroom. IC embraces seven partnership principles (i.e., equality, choice, voice, dialogue, reflection, praxis, and reciprocity) as the teacher and coach collectively engage in model lessons, classroom observations, and exploration of data (Knight). Figure 9 demonstrates the professional development and coaching cycle that the researcher followed throughout this study. In addition, checklists (see Appendix G) were followed each time a coaching session took place.

Measures and Instruments

The TOSCRF (Hammill et al., 2006), a maze procedure, and a content area passage with questions were used to obtain repeated measures.

Fluency-based measures. Studies have found a relationship between reading fluency and comprehension (e.g., Cutting & Scarborough, 2006; Barth et al., 2008; Rasinski et al., 2005). Therefore, the study will use two fluency-based measures: (a) the TOSCRF and (b) the maze procedure.

TOSCRF. Parallel forms of the TOSCRF were used: Form A before the students in the experimental groups received instruction in the Text Pattern Intervention, and Form B during the

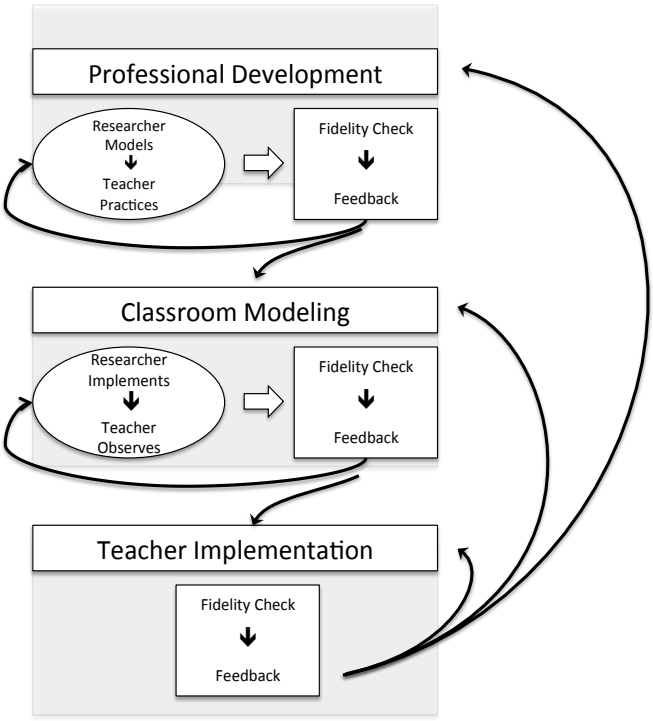

Figure 9. Professional development and coaching procedures. From the University of Kansas Center for Research on Learning Job Corp Vocational Literacy Project Grant# R305B070129. Adapted for the Text Pattern Intervention.

posttest. This group-administered test presented students with sentences in which there were no spaces between the words (e.g., THEBIRDFLEWFAST). The students drew lines between the words for three minutes, which provided data about their contextual reading fluency. To score the TOSCRF, the examiner located the last group of words correctly identified, and the participant received credit for all the words in the prior groups. The students then received credit for all the words correctly identified after the last correct row. The raw scores were converted to a standard score using procedures in the examiner manual (Hammill et al., 2006).

Maze procedure. This measure assessed the students' reading comprehension and ability to discern the meaning of text structures, including passive voice, nominalizations, and

connectives. The maze contained 200 words and required the students to circle the best choice out of three words (i.e., one correct answer and two distractors). Text samples were obtained from open access sources (e.g., http://www.textbooksfree.org/, California Open Source Textbook Project), their readability level was tested using the Flesch-Kincaid scale within Coh-Metrix (University of Memphis Department of Psychology, 2006), and mazes that ask the students to circle words within the context of the passage 25 times were constructed. The students had four minutes to complete this ninth-grade level test, which consisted of science content. Scores were calculated by taking the number of correct items divided by the total items to obtain a percentage.

Content area passage and questions. In addition to the maze, the students read a 400-word passage and answered comprehension questions. The purpose of this measure was to ascertain whether or not the students who learned the Text Pattern Intervention applied their knowledge to content area text. Both the passage and the multiple-choice questions were released items (i.e., practice test items that will not be used again) from a tenth-grade statewide reading assessment (Wisconsin Department of Public Instruction, 2006b). Furthermore, the six comprehension questions required the students to understand, analyze, and critique expository text (Wisconsin Department of Public Instruction, 2006a). Multiple-choice items should assess important concepts, avoid confusing language, contain between three and five reasonable options, and minimize the chance of correct guesses (Frey, Petersen, Edwards, Pedrotti, & Peyton, 2005), and the test questions contained within this measure follow a majority of these rules.

After reading the passage and answering the comprehension questions, which contained social studies knowledge and concepts, the students used four excerpts from the text to convert

verbs to nouns, add connectives, track identifiers, and identify main subjects. This measure determined whether or not the students more readily identified, understood, and used nominalizations and connectives in context after receiving instruction. Each item was scored using an answer key, and the percent correct was noted.

Satisfaction measures. The satisfaction surveys (see Appendix H) that were developed for this study asked students and teachers to rate their attitudes toward the Text Pattern Intervention. These posttest measures consisted of 10 questions rated using a seven-point Likert scale, with each item ranging from "Completely disagree" ("1") to "Completely agree" ("7"). The questions on the students' survey related to their satisfaction with reading and understanding how authors use grammar conventions to convey information whereas the teacher survey asked questions about ease and effectiveness of implementation. The mean satisfaction ratings were compiled by adding the ratings for each item and dividing by the total number of respondents. The means for each teacher's experimental class were also evaluated to gather information about the feasibility and palatability of implementing the intervention.

Procedures

The program for teaching and evaluating the Text Pattern Intervention consisted of 35 instructional sessions (see Appendix I).

Pretest procedures. The pretests were administered over two instructional sessions to both the experimental and comparison groups. On the first day, the students completed the TOSCRF, the maze procedure, the content area passage and questions, and the Reading Self-Concept Scale. During day two, the students were administered the OWLS, so overall, the pretest took an average of 60 minutes.

Instructional procedures. Each lesson included elements of explicit instruction (i.e., describe, model, practice, and generalization). The teachers scored the learning sheets, and if the students earned a score of 80% or better, the class moved on to the next teaching session. When a student did not reach 80% mastery, the teacher analyzed the pattern of errors, delivered individual corrective feedback to the student related to the specific task, and asked the student to complete another learning sheet. This feedback procedure continued until the student demonstrated mastery. The teachers' scoring of the learning sheets were checked to ensure reliability during each of the weekly coaching sessions.

Instructional time. The instructional time was kept track of by logging the number of minutes that the teachers engaged in teaching the Text Pattern Intervention. More specifically, every intervention class taught by Teacher A and Teacher C was personally attended by the researcher. In contrast, Teacher B video-recorded each instructional session that took place and immediately uploaded the file to Dropbox (https://www.dropbox.com), a digital file-sharing program synched to the researcher's computer. Three 2-day site visits to Teacher B's classroom occurred where observational data were collected and two model lessons were performed. The dates and total minutes of instruction were noted on a daily basis in order to document the average length of each lesson.

Interscorer reliability. To obtain data about fidelity of implementation and instructional behaviors (i.e., describe, model, feedback, and practice opportunities), each instructional session was video-recorded with the camera focused solely on the teacher (not on the students). The recording began at the start of instruction in the Text Pattern Intervention and stopped once the teacher indicated that the class would transition to another topic. Two checklists were completed while viewing the instructional sessions.

The first checklist (Instructional Activity) measured the extent to which the teachers used explicit teaching methods (see Appendix D). This form, which was originally developed to investigate differentiated teaching practices (Cornett, 2010), required the rater to catalogue the instructional practice associated with a 30-second time interval. The 16 items that scorers assessed during this study included instructional activities such as lecturing, describing multi-step procedures, modeling, monitoring and questioning, reviewing, and offering feedback.

The Critical Teaching Behavior (CTB) checklist (see Appendix E) evaluated if the teachers implemented the intervention with fidelity. As mentioned, the Text Pattern Intervention follows a specific instructional sequence, and the teaching behaviors included in the checklist are directly aligned with these stages. The rater scored the item as a "2" (i.e., the behavior was present and correct), "1" (i.e., the behavior was present but needs improvement), or "0" (i.e., the behavior was missing or incorrect).

Because these instruments required scorer judgment, reliability checks were conducted. An independent scorer also watched a random sample (20%) of these classes. After viewing the videos, the observers compared their ratings in a side-by-side item analysis and achieved at least 80% inter-rater reliability.

Posttest procedures. The posttest procedures involved the same measures as the pretest. Although an alternate form of the TOSCRF was administered, the maze and content area passage questions remained the same as those used in the pretest. Posttesting occurred in an identical setting to the pretesting with one 30-minute group-administered sitting. During this setting, the students completed the TOSCRF, maze procedure, and content area passage questions. In addition, the students in the experimental group completed satisfaction surveys.

Research Design

The study employed a quasi-experimental, pretest-posttest design. A repeated-measures multivariate analysis of variance (MANOVA) design was used to compare the language and reading performance of the two groups of students who demonstrated a range of low language skills across three reading intervention instructors. The within-subjects factors included performance on (a) the TOSCRF, (b) the maze procedure, and (c) the content area passage questions, which included identification of nominalizations and connectives.

CHAPTER IV

RESULTS

The purpose of the validation study was to determine the effects of instruction in a language intervention for teaching struggling readers to decipher text patterns. This section reports findings for a two-way repeated-measures multivariate analyses of variance (MANOVA). Furthermore, results relative to student and teacher satisfaction ratings, as well as data on the amount of teacher and student time required to teach and learn the intervention are presented. Finally, information about critical teaching behaviors and instructional activities is reported to demonstrate similarities and differences between Teachers A, B, and C.

Two-Way Repeated-Measures MANOVA Results

The MANOVA was conducted with two between-subjects factors and three within-subjects factors. The between-subjects factors included (a) a two-level intervention group variable (i.e., comparison group and experimental group) and (b) a three-level teacher participant variable (i.e., Teacher A, Teacher B, and Teacher C). The within-subjects variables included pretest and posttest scores on (a) the TOSCRF, (b) the modified maze procedure, and (c) the content area passage and questions. Means and standard deviations for the measures are presented in Table 4.

Table 4

Language and Reading Comprehension Test Results by Intervention Group

	Pretest		Posttest	
	Mean	*SD*	Mean	*SD*
Comparison				
TOSCRF (Standard Score)	78.840	8.975	87.720	11.495
Maze procedure (% correct)	72.080	10.116	69.360	10.181
Content area passage (% correct)	18.600	8.529	19.571	9.658
Experimental				
TOSCRF (Standard Score)	78.625	8.069	83.583	9.226
Maze procedure (% correct)	68.292	10.650	69.250	12.127
Content area passage (% correct)	18.417	7.813	47.125	23.797

Multivariate tests. The multivariate test results are displayed in Table 5. The analysis revealed a significant interaction between time and intervention group, as well as significant main effect between intervention groups and a within-subjects effect for time. Thus, the analysis indicated that, on average, the scores across comparison and experimental groups differed significantly on the dependent measures.

Table 5

Multivariate Repeated-Measures Test Results

Effect	Wilks' Λ	*df*	*F*	*p*	η^2
Between-subjects					
Intervention group	.578	(3,41)	9.972	<.001	.422
Teacher group	.720	(6,82)	2.444	.032	.152
Intervention group x Teacher interaction	.702	(6,82)	2.645	.021	.162
Within-subjects					
Time	.455	(3,41)	16.389	<.001	.545
Time x Intervention group interaction	.516	(3,41)	12.808	<.001	.484
Time x Teacher interaction	.948	(6,82)	.371	.895	.026
Time x Intervention group x Teacher interaction	.747	(6,82)	2.147	.057	.136

TOSCRF results. Means and standard deviations for the TOSCRF were presented in Table 4. Using the Bonferroni method, a repeated-measures analysis of variance (ANOVA) on the TOSCRF was conducted at the .017 level as a follow-up test to the repeated-measures MANOVA to determine between- and within-group differences (see Table 6). The results revealed no significant within-group interactions for Time x Intervention group x Teacher, Time x Intervention, or Time x Teacher. A significant main effect for time was found, and the descriptive statistics confirmed this overall increase in scores on the TOSCRF from pretest to posttest, with the average Standard Score changing from 78.735 (*SD* = 8.455) to 85.694 (*SD* = 10.546).

Table 6

Univariate Test Results for the TOSCRF

Source	SS	*df*	*F*	*p*	η^2
Between-subjects effects					
Intervention group	89.038	(1,43)	.758	.389	.017
Teacher	869.105	(2,43)	3.698	.033	.147
Intervention group x teacher interaction	1261.636	(2,43)	5.368	.008	.200
Within-subjects effects					
Time	947.869	(1,43)	34.418	<.001	.445
Time x Intervention group interaction	87.203	(1,43)	3.166	.082	.069
Time x Teacher interaction	13.759	(2,43)	.250	.780	.011
Time x Intervention group x Teacher interaction	173.456	(2,43)	3.149	.053	.128

Maze procedure results. Means and standard deviations for the maze procedure were presented in Table 4. Using the Bonferroni method, a repeated-measures ANOVA on the maze was conducted at the .017 level as a follow-up test to the repeated-measures MANOVA to determine between- and within-group differences (see Table 7). Within-subjects results indicated no significant main effects or interactions for scores on the maze procedure from pretest to posttest.

Table 7

Univariate Test Results for the Maze Procedure

Source	SS	*df*	*F*	*p*	η^2
Between-subjects effects					
Intervention group	86.549	(1,43)	.737	.396	.017
Teacher	1095.209	(2,43)	4.660	.015	.178
Intervention group x teacher interaction	278.827	(2,43)	1.186	.315	.052
Within-subjects effects					
Time	32.519	(1,43)	.322	.573	.007
Time x Intervention group interaction	85.765	(1,43)	.849	.362	.019
Time x Teacher interaction	112.648	(2,43)	.558	.577	.025
Time x Intervention group x Teacher interaction	45.890	(2,43)	.227	.798	.010

Content area passage results. Means and standard deviations for the content area passage scores were presented in Table 4. Using the Bonferroni method, a repeated-measures ANOVA on the content area passage was conducted at the .017 level as a follow-up test to the repeated-measures MANOVA to determine between- and within-group differences (see Table 8). A significant interaction between time and intervention group for percent correct on the content area passage was found, as well as a significant main effect for time. These results showed that the change in content area passage scores over time for the two intervention groups (see Table 4) varied significantly, with the experimental group significantly outperforming the comparison group on the content area passage at posttest.

Table 8

Univariate Test Results for the Content Area Passage

Source	SS	*df*	*F*	*p*	η^2
Between-subjects effects					
Intervention group	4625.970	(1,43)	19.311	<.001	.310
Teacher	797.027	(2,43)	1.664	.201	.072
Intervention group x teacher interaction	221.123	(2,43)	.462	.633	.021
Within-subjects effects					
Time	4232.235	(1,43)	27.040	<.001	.386
Time x Intervention group interaction	4351.782	(1,43)	27.804	<.001	.393
Time x Teacher interaction	156.623	(2,43)	.500	.610	.023
Time x Intervention group x Teacher interaction	557.865	(2,43)	1.782	.180	.077

Post-Hoc Analyses

Because the multivariate repeated-measures test results showed a significant between-subjects interaction for Intervention group x Teacher (see Table 5), post-hoc analyses were performed to further explain the variance between teachers for scores on the TOSCRF, maze procedure, and content area passage.

TOSCRF. The univariate tests results for the TOSCRF revealed a significant between-subjects effect for Intervention group x Teacher (see Table 6); a post-hoc repeated-measures ANOVA was conducted. The file was split by teacher, and the means and standard deviations for the comparison and experimental groups by teacher are displayed in Table 9. Teacher C's average student scores for the comparison class were greater than the scores for the experimental

class on this measure. A scatterplot was also compiled (see Figure 10) to show how individual students in the experimental group for Teachers A, B, and C performed over time.

Table 9

TOSCRF Results by Intervention Group and Teacher

	Pretest		Posttest		Change	
	Mean	*SD*	Mean	*SD*	Mean	95% CI
Comparison						
Teacher A	73.000	3.162	77.800	6.458	+4.800	[64.796, 86.004]
Teacher B	76.923	7.7724	85.077	8.450	+8.154	[77.529, 84.471]
Teacher C	86.571	9.414	99.714	9.639	+13.143	[86.258, 100.028]
Experimental						
Teacher A	78.800	11.520	85.000	16.202	+6.200	[71.296, 92.504]
Teacher B	77.917	5.680	84.667	6.065	+6.750	[77.679, 84.904]
Teacher C	79.714	9.979	80.714	8.381	+1.000	[73.329, 87.099]

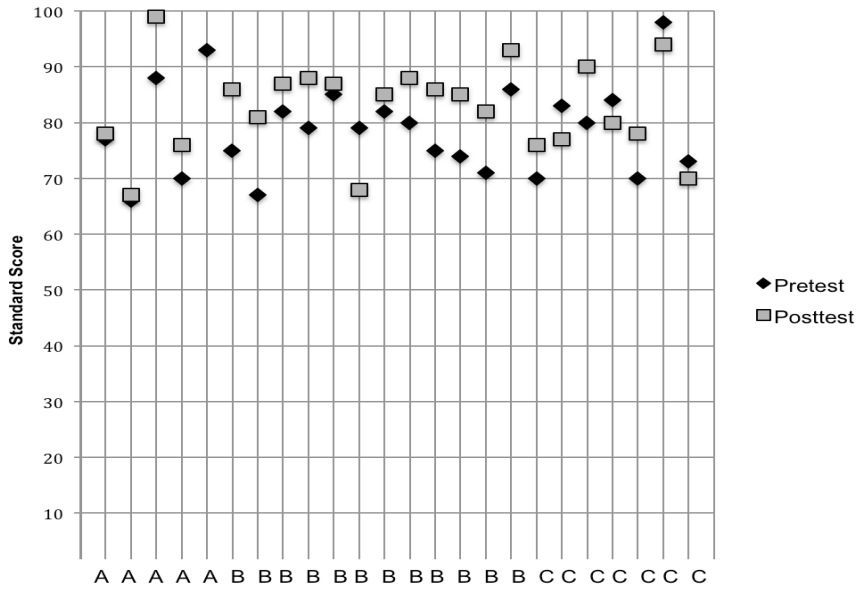

Figure 10. Experimental group pretest and posttest scores for the TOSCRF by teacher and student.

Maze procedure. The between-subjects analysis for the maze showed a significant main effect for teachers (see Table 7), so a post-hoc repeated-measures ANOVA was conducted. The file was split by teacher, and the means and standard deviations for the comparison and experimental groups by teacher are displayed in Table 10. The scores for the students in Teacher A's classes decreased from pretest to posttest. Teacher B's students also demonstrated higher mean scores at pretest than at posttest whereas the students in Teacher C's classes increased their

Table 10

Maze Results by Intervention Group and Teacher

	Pretest		Posttest		Change	
	Mean	*SD*	Mean	*SD*	Difference	95% CI
Comparison						
Teacher A	71.800	4.712	66.200	12.814	−5.600	[61.259, 76.741]
Teacher B	68.231	11.512	66.385	9.674	−1.846	[62.998, 71.617]
Teacher C	79.429	5.855	77.143	4.451	−2.286	[71.656, 84.916]
Experimental						
Teacher A	72.600	12.720	69.200	7.396	−3.400	[63.159, 78.641]
Teacher B	66.500	10.318	66.500	10.449	0.000	[62.014, 70.986]
Teacher C	68.286	10.484	74.000	16.902	+5.714	[64.513, 77.773]

scores on the maze from pretest to posttest. A scatterplot was also compiled (see Figure 11) to show how individual students in the experimental group for Teachers A, B, and C performed on the maze over time.

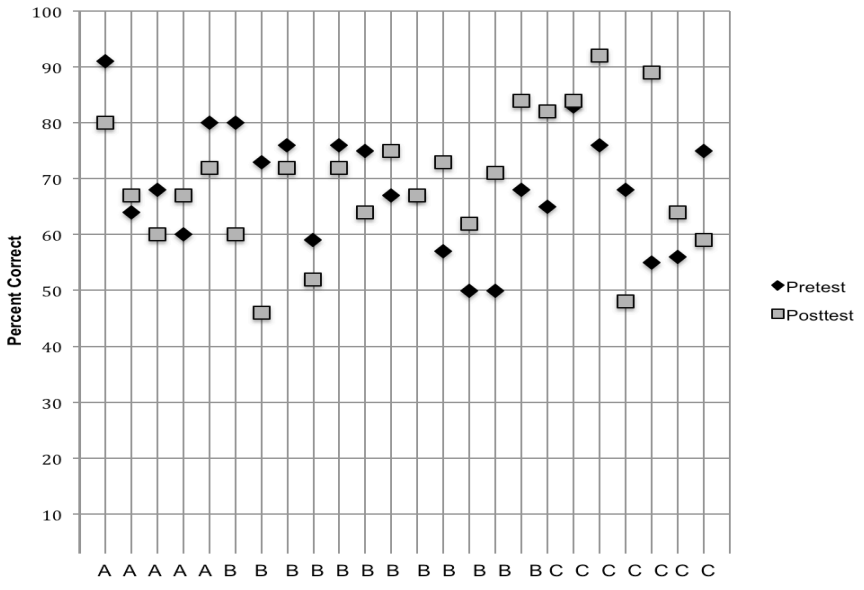

Figure 11. Experimental group pretest and posttest scores for the maze by teacher and student.

Content area passage. Although no between-subject effects were found for teachers on this measure, a significant interaction between time and intervention group for percent correct on the content area passage was found (see Table 8). The standard deviation for the experimental group's posttest content area passage scores was larger than the standard deviations for the other dependent variables at pretest and posttest, so a post-hoc repeated-measures ANOVA was conducted. The file was split by teacher, and the means and standard deviations for experimental groups by teacher are displayed in Table 11. Although Teacher C's students made the most gains from pretest to posttest on the content area passage, Teacher A's class (the smallest group) demonstrated the largest variability across individual students. Because individual students

Table 11

Content Area Passage Results by Intervention Group and Teacher

	Pretest		Posttest		Change	
	Mean	*SD*	Mean	*SD*	Mean	95% CI
Comparison						
Teacher A	15.400	7.503	15.400	7.503	0.000	[−.041, 30.841]
Teacher B	17.000	7.106	20.692	11.884	+3.692	[14.516, 23.176]
Teacher C	23.857	10.303	19.571	9.658	−4.286	[10.958, 32.470]
Experimental						
Teacher A	21.600	8.355	41.600	33.125	+20.000	[16.159, 47.041]
Teacher B	16.417	6.445	42.917	18.258	+26.500	[25.160, 34.173]
Teacher C	19.571	9.658	58.286	24.938	+38.715	[28.172, 49.685]

performed differently on the content area passage, a scatterplot was compiled (see Figure 12), which showed that the change in scores for the experimental group on the content area passage varied considerably across students.

Satisfaction Ratings

The mean satisfaction ratings were obtained to determine the feasibility and palatability of the intervention, and they are reported in Tables 12 and 13. The overall mean rating was 5.310 for the students and 6.217 for the teachers using a seven-point Likert scale.

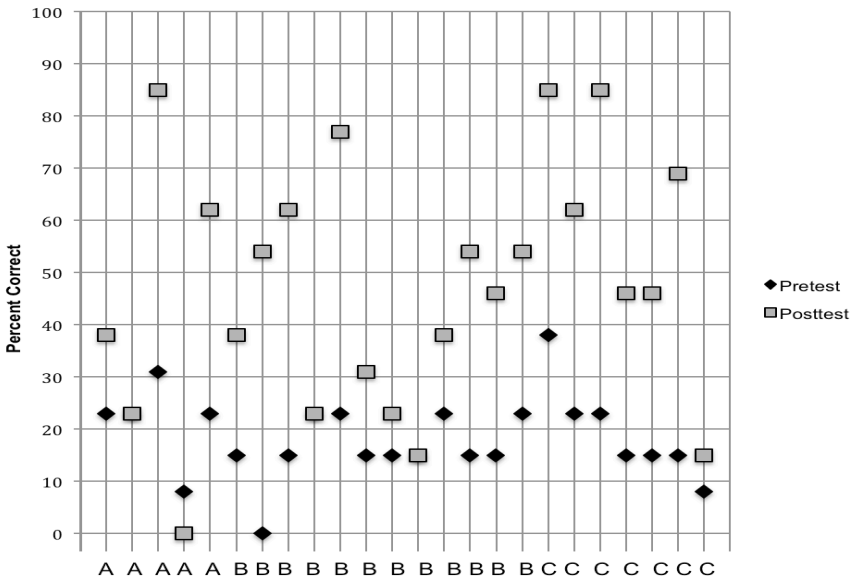

Figure 12. Experimental group pretest and posttest scores for the content area passage by teacher and student.

Student satisfaction. Table 12 displays the mean ratings, standard deviations, and range for each item on the student questionnaire. The items that received the highest scores are related to the statements "I have gotten better at recognizing temporal and causal relationships in the passages that I read" (M = 5.75, SD = 1.67) and "I recognize the relationship between tracking identifiers and the ideas they refer back to" (M = 5.94, SD = 1.38). The lowest rating received from the students was in response to the statement "I understand how to structure noun phrases with descriptive words and prepositions" (M = 4.50, SD = 1.91).

Table 12

Means, Standard Deviations, and Ranges for the Student Satisfaction Survey

After learning about text patterns…			
1.	I have developed more variety when choosing to use action verbs.	Mean *SD* Range	4.71 1.76 1-7
2.	I now better understand the difference between passive and active verbs.	Mean *SD* Range	5.27 1.89 1-7
3.	I now know how to use several different suffixes to change verbs into nouns.	Mean *SD* Range	4.67 2.06 1-7
4.	I understand how to structure noun phrases with descriptive words and prepositions.	Mean *SD* Range	4.40 1.91 1-7
5.	I have gotten better at recognizing temporal and causal relationships in the passages that I read.	Mean *SD* Range	5.54 1.67 1-7
6.	I know how to use temporal conjunctions and transitions to structure well written sentences.	Mean *SD* Range	5.17 1.74 1-7
7.	I know how to use causal conjunctions and transitions to structure well written sentences.	Mean *SD* Range	5.46 1.53 1-7
8.	I recognize the relationship between tracking identifiers and the ideas they refer back to.	Mean *SD* Range	5.79 1.38 2-7
9.	I better understand why writers use text patterns to explain their ideas.	Mean *SD* Range	5.27 1.80 1-7
10.	My reading comprehension skills have improved.	Mean *SD* Range	5.39 1.99 1-7

Teacher satisfaction. The teacher satisfaction survey results are reported in Table 13. As illustrated, the items that received the highest ratings included "This intervention fits with my teaching style, goals, and vision" ($M = 6.67$, $SD = 0.52$) and "I would recommend the use of this intervention to other reading and/or writing teachers" ($M = 6.67$, $SD = 0.58$). The lowest rating by the teachers was in response to the statements "This intervention enhanced my students' writing skills" ($M = 5.83$, $SD = 0.98$) and "I will adapt and use only certain elements of the intervention in the future" ($M = 5.83$, $SD = 1.47$).

Instructional Time

The total amount of time required to deliver instruction in the Text Pattern Intervention varied from teacher to teacher. As the researcher viewed each class, the amount of instructional time that Teachers A, B, and C spent teaching the intervention was totaled up. Teacher A instructed for a total of 1,020 minutes with sessions starting mid-October and ending late in February. Teacher B instructed for a total of 727 minutes with sessions starting late in November and ending early in February. Teacher C instructed for a total of 823 minutes with sessions starting early in January and ending mid-March.

Instructional Activities

Observations across all three classrooms using the Instructional Activity Checklist (see Appendix D) indicated that the teachers spent, on average, the most time giving instructions (18.89%), administering elaborated feedback (14.40%), and describing the intervention procedures (13.67%). In contrast, they spent, on average, the least amount of time listening (0.40%), conducting generalization reviews (0.63%), and not engaging in instruction due to adult interruption (0.63%).

Table 13

Means, Standard Deviations, and Ranges for the Teacher Satisfaction Survey

Please indicate the extent to which you agree or disagree with the following statements…			
1.	This intervention improved my students' ability to identify and understand text patterns.	Mean *SD* Range	6.50 0.87 5-7
2.	Once I understood the intervention, it was easy for me to use with my students.	Mean *SD* Range	6.33 1.21 4-7
3.	The time it took to understand how to implement this intervention was worth the benefits that followed.	Mean *SD* Range	6.33 1.21 6-7
4.	This intervention enhanced my students' reading comprehension skills.	Mean *SD* Range	6.17 1.17 4-7
5.	This intervention enhanced my students' writing skills.	Mean *SD* Range	5.83 0.98 6-7
6.	This intervention enhanced my students' verbal (listening and speaking) comprehension skills.	Mean *SD* Range	6.17 1.17 4-7
7.	I will continue to use all parts of the intervention in the future.	Mean *SD* Range	6.00 1.55 7
8.	I will adapt and use only certain elements of the intervention in the future.	Mean *SD* Range	5.83 1.47 4-7
9.	This intervention fits with my teaching style, goals, and vision.	Mean *SD* Range	6.67 0.52 6-7
10.	I would recommend the use of this intervention to other reading and/or writing teachers.	Mean *SD* Range	6.67 0.58 6-7

Individual teacher results are reported in Figure 13. As illustrated, Teacher A spent the most time physically observing the students (21.75%) but did not spend any time explicitly modeling the intervention (0.00%). Teacher B spent the greatest amount of time on administering directions (23.47%) but the least amount of time on listening (0.15%). Finally, Teacher C spent the most time offering students elaborated feedback (24.91%) and the least amount of time not engaging in instruction due to adult interruption (0.49%).

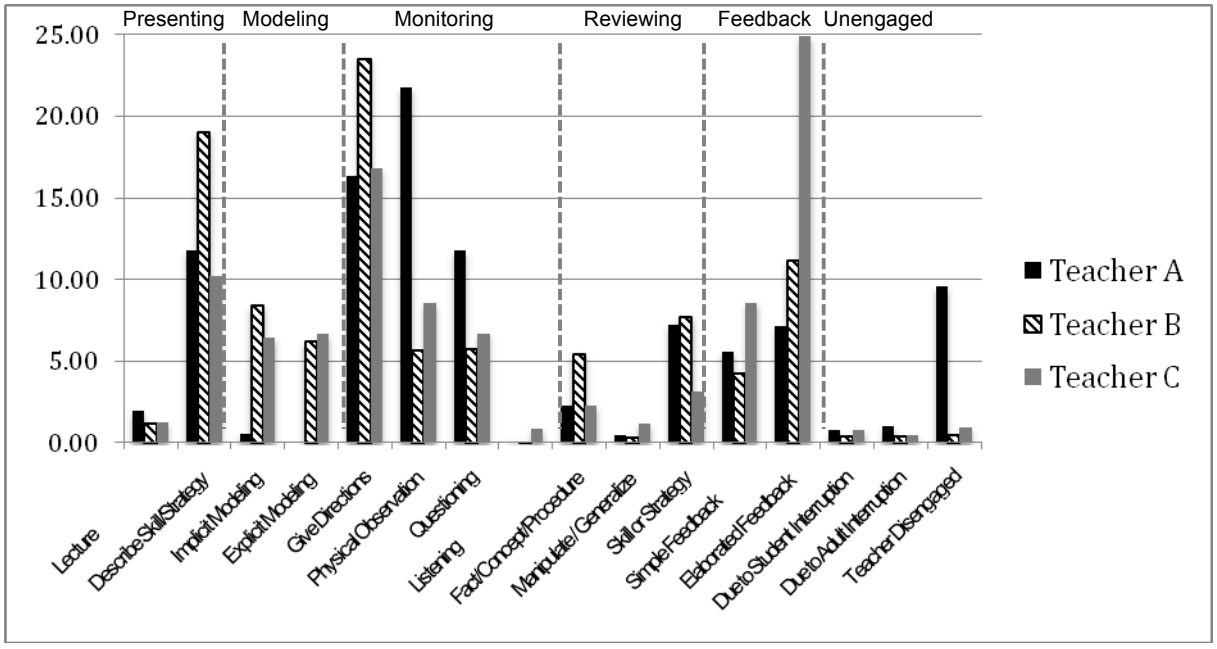

Figure 13. Instructional activities by individual teacher.

Fidelity of Treatment

The Critical Teaching Behaviors (CTB) checklist (see Appendix E) was completed each time instruction in the Text Pattern Intervention occurred. Adherence to the instructional sequence and explicit teaching behaviors varied across teacher. For example, Teacher A exhibited an average of 86% of the critical teaching behaviors whereas Teacher B demonstrated

an average of 92% of the critical teaching behaviors. Finally, Teacher C completed a mean of 98% of the critical teaching behaviors when teaching the intervention. No content components of the Text Pattern Intervention were taught in the comparison classes.

CHAPTER V

DISCUSSION

The purpose of this study was to develop and evaluate the effects of an intervention designed to teach text patterns to struggling high school readers and improve their comprehension of content area textbooks. Specifically, this study examined the effects of explicit instruction in language patterns by assessing: (a) pretest and posttest scores on the Test of Silent Contextual Reading Fluency (TOSCRF; Hammill et al., 2006); (b) pretest and posttest scores on a modified maze procedure; (c) pretest and posttest scores on the content area passage and questions; (d) the relationship between student and teacher satisfaction survey ratings and the time it took to implement the explicit instructional procedures of the intervention.

Within-group comparisons showed several trends. Overall, the average scores across the comparison and experimental groups differed significantly on the dependent measures over time. A significant main effect for time was found for scores on the TOSCRF, but no main effects or interactions were found for scores on the maze procedure from pretest to posttest. Scores on the content area passage yielded a significant interaction between time and intervention group, and these results indicated that the change in content area passage scores over time for the two intervention groups differed significantly. Study results support instruction in the Text Pattern Intervention as an effective procedure for improving the reading comprehension of struggling high school learners.

Conclusions

After teaching students how authors use language patterns to convey meaning in content area textbooks, several conclusions were drawn. First, a significant Intervention group x Teacher interaction was found for scores on the TOSCRF. The results of a post-hoc analysis showed that

Teacher C's students in the comparison group significantly outperformed those in Teacher C's experimental group. Despite these differences, receiving instruction in the Text Pattern Intervention did not account for unique variance in TOSCRF score over time.

Second, results from the maze procedure indicated that regardless of group assignment, the students' scores did not significantly change from pretest to posttest. No differences were found for the between- or within-group variables on this measure. These data run parallel to another study that found weaker relations between performance on the maze and reading comprehension measures when compared to scores on the TOSCRF (Denton et al., 2011). Thus, the maze may not adequately capture the language components that account for reading comprehension.

Third, a significant interaction between time and intervention group for percent correct on the content area passage was found. These results showed that the average change in content area passage scores for the two intervention groups over time differed significantly. On average, the students in the experimental group outperformed the students in the comparison group, which indicated that receiving instruction in the Text Pattern Intervention accounted for unique variance in the content area passage scores over time.

Finally, the findings across the satisfaction survey measures are positive indicators of the feasibility and palatability of the Text Pattern Intervention. Even though the intervention took an average of 15 hours to implement, the students and teachers indicated that they were satisfied with their learning. As a result, the time that the participants spent engaged in explicit instruction, modeling, and practice appeared worthwhile given the educational outcomes, and the positive ratings attest to the intervention's credibility for both teachers and students.

Relationship to Previous Research

This study supports previous research by (a) showing that when teachers use explicit instruction procedures, reading comprehension improves; (b) finding mixed results for scores on fluency measures, such as the TOSCRF and the maze; and (c) extending the studies that found students need to understand grammar structures to make meaning from written text. First, previous studies found that interventions using direct instruction, teacher modeling, and guided practice with scaffolded materials improved the reading comprehension of students with disabilities (Edmonds et al., 2009; Gersten et al., 2001; Kamil et al., 2008; Mastropieri et al., 2003; Swanson & Deshler, 2003; Torgesen et al., 2007), and this study's results mirror these findings. Furthermore, targeted feedback that provides students with specific information about their performance leads to superior educational outcomes (Hattie, 2009), and elaborated feedback was the second most frequent instructional activity engaged in by Teachers A, B, and C. Finally, the Text Pattern Intervention included multiple exposures to language patterns in the context of content area texts, which parallels previous research conclusions that found opportunities to interact with text patterns help students comprehend academic discourse (Scott & Balthazar, 2010).

In addition to explicit instructional procedures, former studies called for reading comprehension tests that demonstrate technical adequacy when measuring the dynamic process of interpreting the meaning of text (Bell et al., 2007; Cutting & Scarborough, 2006; Ehren et al., 2010; Hammill, 2004; Keenan & Betjemann, 2006; Snyder et al., 2005). While previous research found significant relationships between scores on reading fluency measures and comprehension tests (Espin et al., 2010; Hammill et al., 2006; Rasinski et al., 2005), the results of this study showed little correlation between scores on the TOSCRF, the maze procedure, and

the content area passage. Moreover, the students' scores on the TOSCRF increased from pretest to posttest during the pilot study but not the validation study. One possible explanation for these results is that students in grades four through eight participated in the pilot study whereas data for ninth- through twelfth-graders were collected during the validation study. Indeed, Bloom, Hill, Black, and Lipsey (2007) demonstrated that the average effect size growth expected in high school students falls to as low as .06 as compared to an average of .30 for middle school students. Therefore, the relationship between age and reading fluency may account for this variability in scores and needs to be controlled for in future studies.

This study also extends the work of previous studies in several important ways. First, although Systemic Functional Linguistics (SFL) researchers have indicated that content area textbooks contain nominalizations, causal and temporal connectives joining phrases, and passive voice constructions (Coffin, 2004; 2006; Esquinca, 2007; Fang, 2005; Martin, 2002; Schleppegrell et al., 2004; Young & Nguyen, 2002), they have not constructed classroom interventions that teach struggling readers how to decipher complex text patterns as a result of these findings. However, the present study investigated the implications of designing and implementing an intervention that explicitly teaches students how to decipher the complex language patterns appearing in their textbooks.

Efficacy research exploring the effects of teaching language patterns to struggling readers remain scarce, with only four studies in existence (Ebbels & van der Lely, 2001; Ebbels et al., 2007; Hirschman, 2000; Levy & Friedmann, 2009). Therefore, the present study provides a valuable contribution to the field. Students and teachers learned how to use a language intervention that targeted specific grammar structures, and the students receiving instruction in

the Text Pattern Intervention demonstrated statistically significant growth when reading a content area passage and answering questions.

Limitations

This study has several limitations. The following paragraphs describe the major limitations, which include (a) comprehension test construction, (b) comparison group instruction, and (c) makeup of the study sample. The first limitation involves the participants' lack of growth on the maze procedure from pretest to posttest. Even though the maze procedure items in the validation study were modified to target the language structures taught in the intervention (i.e., connectives, noun phrases, and passive voice), the participants' scores remained relatively stable from pretest to posttest. A better measure that uses multiple-choice items may more accurately evaluate the reading comprehension of students (Snyder et al., 2005) before and after they receive instruction in the Text Pattern Intervention. This multiple-choice test also needs to consist of more prompts than were present in the content area passage; a larger amount of text items would increase the sensitivity of this measure.

A second limitation of the study relates to the instruction that took place in the comparison classes. Because Teachers A, B, and C each instructed a comparison and an experimental class, they may have unintentionally introduced elements of the Text Pattern Intervention into their comparison classes. Although fidelity checks were conducted in the experimental classes using the Instructional Activity (see Appendix D) and Critical Teaching Behaviors (see Appendix E) checklists, no fidelity checks were completed in the comparison classes. Moreover, a common intervention was not taught across the comparison classes, which means that the effectiveness of instruction in the comparison groups may have varied between teachers. Future research needs to control for comparison group instruction, and ideally, the

students in the comparison groups should receive instruction in an established program, such as a vocabulary or a text-level processing intervention (Edmonds et al., 2009; Faggella-Luby & Deshler, 2008; Gersten et al., 2001; Kamil et al., 2008; Mastropieri et al., 2003; Swanson & Hoskyn, 2001; Torgesen et al., 2007).

Another possible limitation was the size and makeup of the study sample. The 49 participants were from three different states, and instruction was delivered in both general and special education settings. As such, each district's schedule differed, with Teacher A delivering five instructional sessions every two weeks, Teacher B delivering instruction five times a week, and Teacher C instructing four times a week. Therefore, the results of this study are not readily generalizable to other settings; future research needs to have a larger sample size and control for homogeneity in schedule of instructional sessions.

Future Research

To address the limitations noted above, further research needs to be conducted to determine how Text Pattern Intervention instruction affects the comprehension of struggling readers with and without disabilities who have varying learning profiles. This research would involve (a) determining if the magnitude of gains is worth the time it takes to teach the intervention, (b) assessing the amount of professional development and coaching needed for fidelity of implementation, and (c) exploring how students transfer knowledge of the intervention to content area learning. An interesting extension of this study would explore the issue of robustness. More specifically, the intervention takes approximately 15 hours to implement in its current state, but poor comprehenders may not need instruction in every component of the intervention. An analysis of the intervention's components to weed out any unnecessary parts would make implementation more efficient and effective. Because educators are giving up

instruction in another program, the benefits of teaching the Text Pattern Intervention need to outweigh the lengthy implementation time.

Another area for future research that also relates to time involves the professional development and coaching sessions that took place in this study. A great deal of time was dedicated to observational coaching since the author of the intervention attended every intervention class (either live or virtually) and engaged in coaching sessions with Teachers A, B, and C on a weekly basis. This model, with the intervention's author providing professional development and coaching to every implementing teacher, cannot realistically be replicated in a larger setting with more teachers given the obvious time constraints.

Future research is also needed to refine the intervention for use with larger classes in a general education setting. Since the teachers in this study taught the intervention to relatively small and homogeneous groups of students, a study with a larger sample size would extend the generalizability of the Text Pattern Intervention's effects. Changes to the study design should include (a) attracting larger classes of students with a wider variety of oral and written language needs, (b) converting the content area passages in the last two lessons into a maze format where students would circle the correct connective or identifier (i.e., a word that refers back to a previously introduced concept), and (c) increasing the emphasis on generalization of text pattern knowledge to different settings and demands by supporting students as they use the intervention skills when reading content area textbooks. Because educators often lack a deep understanding about the connection between reading and language, this study would significantly add to the knowledge base of our field. A study where teachers explicitly teach text patterns to students would increase educators' awareness of how language contributes to learning in a print-based environment.

Summary

The results of this study suggest that instruction in the Text Pattern Intervention improves students' performance when answering content area passage questions. This instructional package has the potential of impacting the reading comprehension of discipline-specific texts by struggling adolescent learners with and without disabilities through the use of explicit instructional procedures including direct instruction, teacher think-alouds, and repeated practice opportunities. In addition, both the teacher and student participants in the study indicated that the intervention procedures increased the reading performance of struggling learners. Therefore, this study demonstrates that explicit teaching of the underlying language patterns appearing in content area texts was effective, feasible, and palatable to teachers and students.

REFERENCES

Amendments to the Individuals with Disabilities Education Act, Pub. L. No. 108-446, § 614, 118 Stat. 2647 (2004).

American Psychological Association. (2009). *Publication manual of the American Psychological Association* (6th ed). Washington, DC: American Psychological Association.

August, D., & Hakuta, K. (1997). *Improving schooling for language-minority children: A research agenda*. Washington, DC: National Academy Press.

Baker, C. (2006). *Foundations of bilingual education and bilingualism* (4th ed). Tonawanda, NY: Multilingual Matters Ltd.

Barth, A. E., Catts, H. W., & Anthony, J. L. (2009). The component skills underlying reading fluency in adolescent readers: A latent variable analysis. *Reading and Writing, 22*(5), 567-590.

Bell, S., McCallum, R., Kirk, E., Fuller, E., & McCane-Bowling, S. (2007). Investigation of the Psychometric Attributes of the Test of Silent Contextual Reading Fluency. *Assessment for Effective Intervention, 33*(1), 39.

Berman, R. A., & Katzenberger, I. (2004). Form and function in introducing narrative and expository texts: A developmental perspective. *Discourse Processes, 38*(1), 57-94.

Berman, R. A., & Ravid, D. (2009). Becoming a literate language user: Oral and written text construction across adolescence. In D. R. Olson (Ed.), *The Cambridge handbook of literacy* (pp. 92-111). New York, NY: Cambridge University Press.

Bialostok, S. (2002). Metaphors for literacy: A cultural model of white, middle-class parents. *Linguistics and Education, 13*(3), 347-371.

Bloom, H., Hill, C., Black, A. R., & Lipsey, M. (2007, March). The application of effect sizes in research on children and families: Understanding impacts on academic, emotional behavioral, and economic outcomes. Presentation to the Administration for Children & Families conference, Washington DC.

Brown, P. (2006). Cognitive anthropology across four decades. In C. Jourdan & K. Tuite (Eds.), *Language, culture and society: Key topics in linguistic anthropology* (pp. 96-114). Cambridge: Cambridge University Press.

Brozo, W. G. (2009). Response to intervention or responsive instruction? Challenges and possibilities of response to intervention for adolescent literacy. *Journal of Adolescent & Adult Literacy, 53*(4), 277-281.

Carrow-Woolfolk, E. (1996). *Oral and Written Language Scales: Written expression scale manual*. Circle Pines, MN: American Guidance Service.

Catts, H. W., & Hogan, T. P. (2003). Language basis of reading disabilities and implications for early identification and remediation. *Reading Psychology, 24*(3-4), 223-246.

Catts, H. W., Adlof, S. M., & Weismer, S. E. (2006). Language deficits in poor comprehenders: A case for the simple view of reading. *Journal of Speech, Language, and Hearing Research, 49*(2), 278-293.

Chall, J. S. (1983). *Stages of reading development*. New York, NY: McGraw-Hill.

Chall, J. S., Bissex, G. L., Conard, S. S., & Harris-Sharples, S. H. (1996). *Qualitative assessment of text difficulty: A practical guide for teachers and writers.* Cambridge, MA: Brookline Books.

Christie, F. (1989). Language development in education. In R. Hasan & J. Martin (Eds.), *Language development: Learning language, learning culture: Meaning and choice in*

language: Studies for Michael Halliday (pp.152-198). Westport, CT: Ablex Publishing.

Christie, F. (2002). The development of abstraction in adolescence in subject English. In M. J. Schleppegrell & M. C. Colombi (Eds.), *Developing advanced literacy in first and second languages: Meaning with power* (pp. 45-66). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Coffin, C. (2004). Learning to write history: The role of causality. *Written Communication, 21*(3), 261-289.

Coffin, C. (2006). *Historical discourse*. London: Continuum.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155-159.

Cornett, J. (2010). *What's evidence got to do with it? An observational study of research-based instructional behavior in high school classes* (Master's thesis). Available from ProQuest Dissertations and Theses database. (UMI No. 1476574)

Cummins, J. (1979). Cognitive/academic language proficiency, linguistic interdependence, the optimum age question and some other matters. *Working Papers on Bilingualism*, No. 19, 121-129.

Cummins, J. (1980). The cross-lingual dimensions of language proficiency: Implications for bilingual education and the optimal age issue. *TESOL Quarterly, 14*(2), 175-187.

Cutting, L., & Scarborough, H. (2006). Prediction of reading comprehension: Relative contributions of word recognition, language proficiency, and other cognitive skills can depend on how comprehension is measured. *Scientific Studies of Reading, 10*(3), 277-299.

Denton, C. A., Barth, A. E., Fletcher, J. M., Wexler, J., Vaughn, S., Cirino, P. T., … Francis, D. J. (2011). The relations among oral and silent reading fluency and comprehension in

middle school: Implications for identification and instruction of students with reading difficulties. *Scientific Studies of Reading, 15*(2), 109-135.

Denton, C. A., Wexler, J., Vaughn, S., & Bryan, D. (2008). Intervention provided to linguistically diverse middle school students with severe reading difficulties. *Learning Disabilities Research & Practice, 23*(2), 79-89.

Deshler, D. D., & Hock, M. F. (2007). Adolescent literacy: Where we are—where we need to go. In M. Pressley, A. K. Billman, K. H. Perry, K. E. Reffitt, & J. Moorhead (Eds.), *Shaping literacy achievement: Research we have, research we need* (pp. 98-128). New York, NY: Guilford Press.

Deshler, D., & Schumaker, J. (2005). *Teaching adolescents with disabilities: Accessing the general education curriculum*. Thousand Oaks, CA: Corwin Press.

Duffy, H. (2007, August). *Meeting the needs of significantly struggling learners in high school: A look at approaches to tiered intervention.* Washington, DC: National High School Center at the American Institutes for Research.

Ebbels, S., & van der Lely, H. (2001). Meta-syntactic therapy using visual coding for children with severe persistent SLI. *International Journal of Language & Communication Disorders, 36*(Suppl), 345-350.

Ebbels, S. H., van der Lely, H. K. J., & Dockrell, J. E. (2007). Intervention for verb argument structure in children with persistent SLI: A randomized control trial. *Journal of Speech, Language, and Hearing Research, 50*(5), 1330-1349.

Echevarria, J., Short, D., & Powers, K. (2006). School reform and standards-based education: A model for English-language learners. *The Journal of Educational Research, 99*(4), 195-211.

Edmonds, M. S., Vaughn, S., Wexler, J., Reutebuch, C., Cable, A., Tackett, K. K., & Schnakenberg, J.W. (2009). A synthesis of reading interventions and effects on reading comprehension outcomes for older struggling readers. *Review of Educational Research, 79*(1), 262-300.

Ehren, B. J., Deshler, D. D., & Graner, P. S. (2010). Using the content literacy continuum as a framework for implementing RTI in secondary schools. *Theory Into Practice, 49*(4), 315-322.

Espin, C., Wallace, T., Lembke, E., Campbell, H., & Long, J. (2010). Creating a progress-monitoring system in reading for middle-school students: Tracking progress toward meeting high-stakes standards. *Learning Disabilities Research & Practice, 25*(2), 60-75.

Esquinca, A. (2007). Academic writing in a corpus of 4th grade science notebooks: An analysis of student language use and adult expectations of the genres of school science. *Dissertation Abstracts International, 68*(3), 856A. (UMI No. 3257785)

Faggella-Luby, M. N., & Deshler, D. D. (2008). Reading comprehension in adolescents with LD: What we know; what we need to learn. *Learning Disabilities Research & Practice, 23*(2), 70-78.

Fang, Z. (2005). Scientific literacy: A systemic functional linguistics perspective. *Science Education, 89*(2), 335-347.

Fang, Z., Schleppegrell, M. J., & Cox, B. E. (2006). Understanding the language demands of schooling: Nouns in academic registers. *Journal of Literacy Research, 38*(3), 247-273.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*, 175-191.

Fletcher, J. M., Lyon, G. R., Barnes, M., Stuebing, K. K., Francis, D. J., Olson, R. K.,… Shaywitz, B. A. (2001). Classification of learning disabilities: An evidence-based evaluation. In R. Bradley, L. C. Danielson, & D. P. Hallahan (Eds.), *Identification of learning disabilities: Research to practice* (pp. 185-250). Mahwah, NJ: Lawrence Erlbaum.

Fletcher, J., & Vaughn, S. (2009). Response to intervention: Preventing and remediating academic difficulties. *Child Development, 3*(1), 30-37.

Foorman, B. R., & Connor, C. M. (2011). Primary grade reading. In M. L. Kamil, P. D. Pearson, E. B. Moje, & P. P. Afflerbach (Eds.), *Handbook of reading research: Volume IV* (pp. 136-156). New York, NY: Routledge.

Frey, B. B., Petersen, S., Edwards, L. M., Pedrotti, J. T., Peyton, V. (2005). Item-writing rules: Collective wisdom. *Teaching and Teacher Education, 21*, 357-364.

Fuchs, L. S., & Fuchs, D. (2009). On the importance of a unified model of responsiveness to intervention. *Child Development, 3*(1), 41-43.

Gersten, R., & Baker, S. (2003). English-language learners with learning disabilities. In H. L. Swanson, K. R. Harris, & S. Graham (Ed.), *Handbook of learning disabilities* (pp. 94-109). New York, NY: The Guilford Press.

Gersten, R., Fuchs, L. S., Williams, J. P., & Baker, S. (2001). Teaching reading comprehension strategies to students with learning disabilities: A review of research. *Review of Educational Research, 71*(2), 279-320.

Geva, E. (2006). Second-language oral proficiency and second-language literacy. In D. August & T. Shanahan (Eds.), *Developing literacy in second-language learners: Report of the*

National Literacy Panel on language-minority children and youth (pp. 123-139). Mahwah, NJ: Lawrence Erlbaum Associates.

Graesser, A. C., McNamara, D. S., Louwerse, M. M., & Cai, Z. (2004). Coh-metrix: Analysis of text on cohesion and language. *Behavior Research Methods, Instruments, & Computers, 36*(2), 193-202.

Graesser, A., Millis, K., & Zwaan, R. (1997). Discourse comprehension. *Annual Review of Psychology, 48*(1), 163-189.

Graner, P. S. (n.d.). Strategic Instruction Model (SIM): Critical teaching behaviors general teaching behaviors list. *Inservice Training Issues Guidebook*. Lawrence, KS: Center for Research on Learning.

Haagar, D., & Windmueller, M. P. (2001). Early reading intervention for English language learners at-risk for learning disabilities: Student and teacher outcomes in an urban school. *Learning Disability Quarterly, 24*(4), 235-249.

Halliday, M.A.K. (1987). Spoken and written modes of meaning. In R. Horowitz, & S. J. Samuels (Eds.), *Comprehending oral and written language* (pp. 55-81). San Diego, CA: Academic Press, Inc.

Halliday, M.A.K., & Matthiessen, C.M.I.M. (2004). *An introduction to functional grammar* (3rd ed.). London: Arnold.

Hammill, D. (2004). What we know about correlates of reading. *Exceptional Children, 70*(4), 453-469.

Hammill, D. D., Wiederholt, J. L., & Allen, E. A. (2006). *TOSCRF: Test of Silent Contextual Reading Fluency: Examiner's manual*. Austin, TX: PRO-ED.

Harman, R. (2009). Systemic functional linguistics and the teaching of literature in urban school classrooms. *Dissertation Abstracts International Section A: Humanities and Social Sciences, 69*(9-A), 3483.

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. New York, NY: Routledge.

Hoover, W. A., & Gough, P. B. (1990). The simple view of reading. *Reading and Writing: An Interdisciplinary Journal, 2*, 127-160.

Hirschman, M. (2000). Language repair via metalinguistic means. *International Journal of Language & Communication Disorders, 35*(2), 251-268.

Ihle, F. M. (2010). *Fundamentals in understanding text patterns: Instructor's manual.* Lawrence: University of Kansas Center for Research on Learning.

Kamil, M. L., Borman, G. D., Dole, J., Kral, C. C., Salinger, T., & Torgesen, J. (2008). *Improving adolescent literacy: Effective classroom and intervention practices: A practice guide* (NCEE #2008-4027). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from http://ies.ed.gov/ncee/wwc.

Keenan, J. M., & Betjemann, R. S. (2006). Comprehending the Gray Oral Reading Test without reading it: Why comprehension tests should not include passage-independent items. *Scientific Studies of Reading, 10*(4), 363-380.

Kelly, A. (2004). Design research in education: Yes, but is it methodological? *The Journal of the Learning Sciences, 13*(1), 115-128.

Kincaid, J. P., Fishburne, R. P., Rogers, R. L., & Chissom, B. S. (1975). *Derivation of new readability formulas (automated readability index, Fog count, and Flesch reading ease*

formula) for navy enlisted personnel. (Report No. 8-75). Memphis, TN: Chief of Naval Technical Training.

Klingner, J. K., Artiles, A. J., & Barletta, L. M. (2006). English language learners who struggle with reading: Language acquisition or LD? *Journal of Learning Disabilities, 39*(2), 108-128.

Knight, J. (2009). *Coaching: Approaches & perspectives*. Thousand Oaks, CA: Corwin Press.

Kotula, A. W. (2003). Matching readers to instructional materials: The use of classic readability measures for students with language learning disabilities and dyslexia. *Topics in Language Disorders, 23*(3), 190-203.

Levy, H., & Friedmann, N. (2009). Treatment of syntactic movement in syntactic SLI: A case study. *First Language, 29*(1), 15-50.

Martin, J. R. (2009). Genre and language learning: A social semiotic perspective. *Linguistics and Education: An International Research Journal, 20*(1), 10-21.

Martin, J. R. (2002). Writing history: Construing time and value in discourses of the past. In M. J. Schleppegrell & M. C. Colombi (Eds.), *Developing advanced literacy in first and second languages: Meaning with power* (pp. 87-118). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Martin, J., & Rose, D. (2007a). Interacting with text: The role of dialogue in learning to read and write. *Foreign Studies Journal*, 66-80.

Martin, J., & Rose, D. (2007b). *Working with discourse: Meaning beyond the clause*. London: Continuum.

Mastropieri, M. A., Scruggs, T. E., & Graetz, J. E. (2003). Reading comprehension instruction for secondary students: Challenges for struggling students and teachers. *Learning Disability Quarterly, 26*(2), 103-116.

McCardle, P., & Chhabra, V. (2004). *The voice of evidence in reading research.* New York, NY: Brookes.

Nation, K. (2005). Connections between language and reading in children with poor reading comprehension. In H. W. Catts & A. G. Kamhi (Eds.), *The connection between language and reading disabilities* (pp. 41-54). Mahwah, NJ: Lawrence Erlbaum.

Nation, K., Clarke, P., Marshall, C. M., & Durand, M. (2004). Hidden language impairments in children: Parallels between poor reading comprehension and specific language impairment? *Journal of Speech, Language, and Hearing Research, 47*(1), 199-211.

Nation, K., & Norbury, C. F. (2005). Why reading comprehension fails: Insights from developmental disorders. *Topics in Language Disorders, 25*(1), 21-32.

National Center for Education Statistics. (2009). *The nation's report card: Reading 2009* (NCES 2010-458). Washington, DC: Institute of Education Sciences, U.S. Department of Education.

Paslawski, T. (2005). The Clinical Evaluation of Language Fundamentals (CELF-4): A review. *Canadian Journal of School Psychology, 20*(1-2), 129.

Piriyasilpa, Y. (2009). Periodicity and its use in language teaching. *TESL-EJ, 12*(4). Retrieved from http://www.tesl-ej.org/wordpress/issues/volume12/ej48/ej48a1-2/

Plomp, T., & Nieveen, N. (2009). *An introduction to educational design research*. Netzodruk, Enschede: Netherlands Institute for Curriculum Development.

Rasinski, T., Padak, N., McKeon, C., Wilfong, L., Friedauer, J., & Heim, P. (2005). Is reading

fluency a key for successful high school reading? *Journal of Adolescent & Adult Literacy, 49*(1), 22-27.

Reinking, D., & Bradley, B. A. (2008). *Formative design experiments: Approaches to language and literacy research*. New York, NY: Teachers College Press.

Rice, M. L., Hoffman, L., & Wexler, K. (2009). Judgments of omitted BE and DO in questions as extended finiteness clinical markers of SLI to fifteen years: A study of growth and asymptote. *Journal of Speech, Language, and Hearing Research, 52*, 1417-1433.

Rose, D. (2006). Reading genre: A new wave of analysis. *Linguistics and the Human Sciences, 2*(2), 185-204.

Rose, D. (2007). A reading based model of schooling. *Pesquisas em Discurso PedagÛgico, 4*(2).

Roth, W. M., & Lee, Y. J. (2007). "Vygotsky's neglected legacy": Cultural-historical activity theory. *Review of Educational Research, 77*(2), 186-232.

Scarborough, H. S. (2005). Developmental relationships between language and reading: Reconciling a beautiful hypothesis with some ugly facts. In H. W. Catts & A. G. Kamhi (Eds.), *The connections between language and reading disabilities* (pp. 3-24). Mahwah, NJ: Lawrence Erlbaum Associates.

Schleppegrell, M. J. (2001). Linguistic features of the language of schooling. *Linguistics and Education, 12*(4), 431-459.

Schleppegrell, M. J. (2002). Challenges of the science register for ESL students: Errors and meaning-making. In M. J. Schleppegrell & M. C. Colombi (Eds.), *Developing advanced literacy in first and second languages: Meaning with power* (pp. 119-142). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Schleppegrell, M. (2004). *The language of schooling: A functional linguistics perspective*.

Mahwah, NJ: Erlbaum.

Schleppegrell, M. J. (2007). At last: The meaning in grammar. *Research in the Teaching of English, 42*(1), 121-128.

Schleppegrell, M. J., Achugar, M., & Oteiza, T. (2004). The grammar of history: Enhancing content-based instruction through functional focus on language. *TESOL Quarterly: A Journal for Teachers of English to Speakers of Other Languages and of Standard English as a Second Dialect, 38*(1), 67-93.

Schumaker, J. B., & Deshler, D. D. (2006). Teaching adolescents to be strategic learners. In D. D. Deshler & J. B. Schumaker (Eds.), *Teaching adolescents with disabilities* (pp. 121-156). CA: Corwin Press.

Schumaker, J. B., & Deshler, D. D. (2009). Adolescents with learning disabilities as writers: Are we selling them short? *Learning Disabilities Research & Practice, 24*(2), 81-92.

Schumaker, J. B., & Lyerla, K. D. (1991). *The paragraph writing strategy: Instructor's manual.* Lawrence: University of Kansas Institute for Research in Learning Disabilities.

Schumaker, J. B., & Deshler, D. D. (2009). Adolescents with learning disabilities as writers: Are we selling them short? *Learning Disabilities Research & Practice, 24*(2), 81-92.

Schumaker, J. B., & Sheldon, J. (1985). *The sentence writing strategy: Instructor's manual.* Lawrence: University of Kansas Institute for Research in Learning Disabilities.

Schumaker, J. B., & Deshler, D. D. (2009). Adolescents with learning disabilities as writers: Are we selling them short? *Learning Disabilities Research & Practice, 24*(2), 81-92.

Scott, C. M., & Balthazar, C. H. (2010). The grammar of information: Challenges for older students with language impairments. *Topics in Language Disorders, 30*(4), 288-307.

Shanahan, T., & Shanahan, C. (2008). Teaching disciplinary literacy to adolescents: Rethinking content-area literacy. *Harvard Educational Review. Special Issue: Adolescent Literacy, 78*(1), 40-59.

Snyder, L., Caccamise, D., & Wise, B. (2005). The assessment of reading comprehension: Considerations and cautions. *Topics in Language Disorders, 25*(1), 33.

Stokes, S. F., & Klee, T. (2009). The diagnostic accuracy of a new test of early nonword repetition for differentiating late talking and typically developing children. *Journal of Speech, Language, & Hearing Research, 52*, 872-882.

Swanson, H. L., & Deshler, D. (2003). Instructing adolescents with learning disabilities: Converting a meta-analysis to practice. *Journal of Learning Disabilities, 36*(2), 124-135.

Swanson, H. L., & Hoskyn, M. (2001). Instructing adolescents with learning disabilities: A component and composite analysis. *Learning Disabilities Research & Practice, 16*(2), 109-119.

Swiderski, S. M. (2007). Assessing reasoning through writing: Developing and examining approaches based on psychological and linguistic theories. *Dissertation Abstracts International, 67*(07), 2467A. (UMI No. 3225675)

Torgesen, J. K., Houston, D. D., Rissman, L. M., Decker, S. M., Roberts, G., Vaughn, S., … Lesaux, N. (2007). *Academic literacy instruction for adolescents: A guidance document from the Center on Instruction*. Portsmouth, NH: RMC Research Corporation, Center on Instruction.

University of Memphis Department of Psychology. (2006). *Coh-Metrix version 2.0 indices.* Unpublished instrument. Retrieved from http://cohmetrix.memphis.edu/CohMetrixWeb2/HelpFile2.htm.

van Dijk, T. A. (2001). Critical discourse analysis. In D. Schiffrin, D. Tannen, & H. E. Hamilton (Eds.), *The handbook of discourse Analysis* (pp. 352-371). Malden, MA: Blackwell Publishing.

Schumaker, J. B., & Deshler, D. D. (2009). Adolescents with learning disabilities as writers: Are we selling them short? *Learning Disabilities Research & Practice, 24*(2), 81-92.

Vaughn, S., Fletcher, J. M., Francis, D. J., Denton, C. A., Wanzek, J., Wexler, J., … Romain, M. A. (2008). Response to intervention with older students with reading difficulties. *Learning and Individual Differences, 18*(3), 338-345.

Wauters, L. N., Telling, A.E.J.M., Van Bon, W.H.J., & Van Haaften, A. W. (2003). Mode of acquisition of word meanings: The viability of a theoretical construct. *Applied Psycholinguistics, 24*(3), 385-406.

Wisconsin Department of Public Instruction. (2006a). *Guide to grade 10 released item books in reading and mathematics.* Monterey, CA: CTB/McGraw-Hill.

Wisconsin Department of Public Instruction. (2006b). *Reading grade 10 released item book.* Monterey, CA: CTB/McGraw-Hill.

Young, R. F., & Nguyen, H. T. (2002). Modes of meaning in high school science. *Applied Linguistics, 23*(3), 348-372.

APPENDIX A

GLOSSARY OF TERMS

- Clause—a group of words that contain at least one subject and verb
- Conjunctions—words used to connect clauses or sentences together
- Connectives—words or phrases that link clauses together
- Genre—a category of characterized by similarities in form, style, or subject matter
- Identifier—words used to introduce or track nouns in a text
- Lexical density—the number of content words versus total words
- Lexicon—vocabulary words and expressions
- Logical operators—words used to connect two sentences in a grammatically correct way
- Morphosyntax—patterns of word and sentence formations
- Nominalizations—words that have been converted into noun phrases
- Noun phrase—a group of words that function as the subject or object of a sentence
- Pragmatics—language use in the context of a situation
- Registers—language patterns used in a particular context
- Semantics—the meaning of a word, phrase, sentence or text
- Situational model—the reader's mental model of what the text is about
- Syntax—the arrangement of words; word order
- Verb phrase—a group of words that state something about the subject of the sentence

APPENDIX B

LITERATURE REVIEW SEARCH TERMS

The search terms for studies examining grammar patterns consisted of*: systemic functional linguistics*, and *science, social studies*, or *English language arts*, all in combination with *schools* or *education* and *reading* or *literacy*. In contrast, to review studies of reading comprehension assessments, the following search terms were used: *assessment* or *test* or *measure*, and *predict** or *correlat**, and *test validity* or *test reliability*, and *reading comprehension* or *reading skills*.

APPENDIX C

COH-METRIX ANALYSIS

Descriptive Statistics

Language Feature	School Level	Subject matter	N	Mean (*SD*)	
Positive Additive Connectives	Middle	World History	3	34.826	(8.219)
		Biology	3	32.229	(12.620)
		English Language Arts	2	20.600	(12.462)
		Total	8	30.296	(11.147)
	High	World History	3	41.317	(5.266)
		Biology	3	12.418	(8.164)
		English Language Arts	2	31.404	(0.043)
		Total	8	28.002	(14.503)
Negative additive connectives	Middle	World History	3	7.226	(7.954)
		Biology	3	9.225	(6.044)
		English Language Arts	2	18.647	(1.414)
		Total	8	10.831	(7.275)
	High	World History	3	7.866	(5.193)
		Biology	3	11.111	(7.924)
		English Language Arts	2	6.869	(1.378)
		Total	8	8.834	(5.445)
Positive causal connectives	Middle	World History	3	19.727	(14.247)
		Biology	3	21.685	(13.754)
		English Language Arts	2	12.757	(1.37)
		Total	8	18.718	(11.255)
	High	World History	3	17.718	(8.626)
		Biology	3	43.137	(9.804)
		English Language Arts	2	22.580	(12.522)
		Total	8	28.465	(14.926)
Negative causal connectives	Middle	World History	3	0.659	(1.141)
		Biology	3	0.000	(0.000)
		English Language Arts	2	1.963	(0.003)
		Total	8	0.738	(1.018)
	High	World History	3	1.310	(1.134)
		Biology	3	0.654	(1.132)
		English Language Arts	2	0.000	(0.000)
		Total	8	0.736	(1.016)

Positive temporal connectives	Middle	World History	3	3.940	(1.965)
		Biology	3	4.603	(4.975)
		English Language Arts	2	4.906	(1.381)
		Total	8	4.430	(2.937)
	High	World History	3	7.872	(1.984)
		Biology	3	8.497	(2.995)
		English Language Arts	2	6.865	(6.930)
		Total	8	7.854	(3.317)
Negative temporal connectives	Middle	World History	3	0.656	(1.137)
		Biology	3	1.979	(1.977)
		English Language Arts	2	0.000	(0.000)
		Total	8	0.988	(1.494)
	High	World History	3	0.661	(1.144)
		Biology	3	0.000	(0.000)
		English Language Arts	2	0.981	(1.387)
		Total	8	0.493	(0.913)
Logic operator connectives	Middle	World History	3	40.732	(16.958)
		Biology	3	39.469	(16.099)
		English Language Arts	2	39.252	(2.721)
		Total	8	39.888	(12.56)
	High	World History	3	44.596	(4.199)
		Biology	3	25.490	(8.547)
		English Language Arts	2	48.093	(9.782)
		Total	8	38.306	(12.422)
Flesch-Kincaid grade level	Middle	World History	3	8.027	(0.792)
		Biology	3	8.555	(0.988)
		English Language Arts	2	8.684	(0.494)
		Total	8	8.389	(0.766)
	High	World History	3	9.729	(0.769)
		Biology	3	9.999	(1.472)
		English Language Arts	2	8.214	(2.010)
		Total	8	9.451	(1.401)
Modifiers per noun phrase	Middle	World History	3	0.930	(0.100)
		Biology	3	0.990	(0.066)
		English Language Arts	2	1.071	(0.040)
		Total	8	0.988	(0.088)
	High	World History	3	0.981	(0.084)
		Biology	3	0.929	(0.040)
		English Language Arts	2	0.757	(0.194)
		Total	8	0.905	(0.130)

Higher level constituents per word	Middle	World History	3	0.689	(0.019)
		Biology	3	0.690	(0.003)
		English Language Arts	2	0.681	(0.030)
		Total	8	0.688	(0.016)
	High	World History	3	0.691	(0.020)
		Biology	3	0.727	(0.015)
		English Language Arts	2	0.767	(0.059)
		Total	8	0.724	(0.041)
Words before the main verb of main clause in sentences	Middle	World History	3	4.277	(0.161)
		Biology	3	3.993	(0.559)
		English Language Arts	2	4.256	(0.733)
		Total	8	4.165	(0.440)
	High	World History	3	4.739	(0.228)
		Biology	3	5.173	(0.991)
		English Language Arts	2	2.000	(0.943)
		Total	8	4.217	(1.528)
Positive logical connectives	Middle	World History	3	22.359	(14.85)
		Biology	3	11.198	(7.488)
		English Language Arts	2	9.810	(5.537)
		Total	8	15.036	(10.978)
	High	World History	3	19.027	(7.5)
		Biology	3	35.294	(3.397)
		English Language Arts	2	21.594	(5.581)
		Total	8	25.769	(9.336)
Negative logical connectives	Middle	World History	3	7.884	(7.874)
		Biology	3	9.225	(6.044)
		English Language Arts	2	20.610	(1.416)
		Total	8	11.569	(7.744)
	High	World History	3	9.176	(5.665)
		Biology	3	11.765	(8.985)
		English Language Arts	2	6.869	(1.378)
		Total	8	9.570	(6.06)

Effect Sizes for Age and Content Area

Language structure	HS - MS	WS - Bio	WS - ELA	Bio - ELA
Flesch-Kincaid grade level (0-12)	.931**	-.350	.376	.726*
Noun phrase incidence per 1000 words	-.473	1.772**	2.490**	.717*
Mean number of modifiers per NP	-.868**	-.040	.445	.485
Mean higher-level constituents per word	1.142**	-0.576*	-1.066**	-.490
Mean words before the main verb	.081	-.116	2.138**	2.254**
Logical operator connectives incidence	-.135	.868**	-.086	-.954**
Positive logical connectives incidence	1.239**	-.295	.576*	.871**
Negative logical connectives incidence	-.306	-.301	-.797*	-.497
Positive additive connectives incidence	-.257	1.763**	1.351**	-.412
Negative additive connectives incidence	-.323	-.424	-.842**	-.418
Positive causal connectives incidence	.860**	-1.208**	.093	1.301**
Negative causal connectives incidence	-.002	.747*	.003	-.744*
Positive temporal connectives incidence	.939**	-.177	.006	.182
Negative temporal connectives incidence	-.405	-.271	.138	.408

Note. HS = high school; MS = middle school; WS = world history; Bio = biology; ELA = English language arts. ***d* > .80; **d* .50-.70.

APPENDIX D

INSTRUCTIONAL ACTIVITY CHECKLIST

Teacher: _____ **Subject:** _____ **Date:** _____Task Number_____

Directions: After the teacher begins the class, begin your timer. After 30 seconds have passed, you should make your first observation on the horizontal line. Your observation should be complete within 30 seconds. Then, wait to begin the next observation when the timer reaches 0. There are three categories of observation variables listed along the top row of this matrix (1-Learning Arrangement, 2-Transition Time, and 3-Instructional Activity). Note, each category of variables is shown in a different color. At each observation interval, one mark should be made in each category so that every row contains 3 marks. Mark 1 in only one of the Learning Arrangement boxes. If the class is transitioning between activities mark 1, if they are not mark O. Mark 1 in only one of the Instructional Activity boxes. Finally, **only mark the first instructional activity observed at the beginning of the observation interval.**

	INSTRUCTIONAL ACTIVITY																
			Modeling			Monitoring & Questioning			Review			Feedback		Not Engaged in Instruction		
	Lecture *Giving Content Information*	**Describe Skill/Strategy** *"To write ...(name steps)"*	**Implicit Modeling** *Demonstrate Only*	**Explicit Modeling** *Demonstrate AND Explain*	**Give Directions**	**Physical Observation** *(e.g., watching students)*	**Questioning**	**Listening** *(Full 10-seconds)*	**Fact/Concept/Procedure** *Recall Facts/Concepts*	**Manipulate / Generalize** *Use recently learned skill*	**Skill or Strategy**	**Simple Feedback** *Task performed correct*	**Elaborated Feedback** *Specific Info. / Re-Teaching*	**Due to Student Interruption**	**Due to Adult Interruption**	**Teacher Disengaged**
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																
18																
19																
20																

APPENDIX E

EXAMPLE CRITICAL TEACHING BEHAVIOR CHECKLISTS

Critical Teaching Behaviors (CTB)
Lesson 3: Changing Verbs into Nouns

Teacher Observed:_____ Date of lesson: _____

Date observed: _____

CTB	Rating	Comments
Describe		
• Gains students' attention and states expectations	2 1 0	
• Explains lesson goals and connects to past learning	2 1 0	
• Describes scenarios and contexts in which different forms of each verb might occur using content from the manual	2 1 0	
• Discusses how to use the verbs provided and write complete and correct sentences	2 1 0	
• Reviews how to use the verb-subject identification procedure	2 1 0	
• Checks regularly for understanding using listening, speaking, reading, and writing tasks	2 1 0	
• Proceeds in appropriately sized learning steps	2 1 0	
• Asks sufficient number of questions	2 1 0	
• Simplifies question to student, as needed	2 1 0	
• Communicates positive expectations for student learning and progress	2 1 0	
• Personalizes instruction	2 1 0	
Model		
• Involves the students in identifying the complete verb and main subject using content from Cue Card #6	2 1 0	
• Demonstrates how some suffixes turn verbs into nouns using content from Cue Card #8	2 1 0	
• Enlists the students participation in writing sentences with the target words as subjects using content from Cue Card #8	2 1 0	
• Helps students identify verbs in sentences and change the verbs into nouns using content from Learning Sheet 3.1	2 1 0	

P. Graner: adapted form, CTB from C. Kea unpublished dissertation * See CTBs for specific stages of Acquisition and Generalization (Inservice Training Issues Guidebook) Adapted by fihle 8.27.10

• Checks regularly for understanding using listening, speaking, reading, and writing tasks	2 1 0	
• Calls upon non-volunteers	2 1 0	
• Asks sufficient number of questions	2 1 0	
• Eliminates off-task distractions	2 1 0	
• Uses students' names	2 1 0	
• Uses enthusiasm and humor	2 1 0	
Controlled Practice		
• Directs students to complete Learning Sheet 3.2a	2 1 0	
• Uses specific descriptive praise for correct responses	2 1 0	
• Uses specific descriptive corrective feedback for incorrect responses	2 1 0	
• Models/reteaches as necessary using Learning Sheet 3.2b	2 1 0	
• Provides immediate individual or group feedback	2 1 0	
• Guides student to correct answer by leading, when appropriate	2 1 0	

Generalization

• Uses diverse and sufficient examples patterned after the examples in the manual	2 1 0	
• Varies stimulus materials	2 1 0	
• Provides and elicits rationales for use of the strategy	2 1 0	
• Uses intermittent reinforcement	2 1 0	

P. Graner: adapted form, CTB from C. Kea unpublished dissertation * See CTBs for specific stages of Acquisition and Generalization (Inservice Training Issues Guidebook) Adapted by fihle 8.27.10

APPENDIX F

SAMPLE LEARNING SHEET

Introducing Ideas and Tracking Identifiers (INDEPENDENT PRACTICE)

Directions:

1. Identify the main subject in the first sentence; then circle the correct tracking identifiers.
2. List some important details that you learned from reading the paragraphs.
3. Think of an appropriate title consisting of a few words that describe what the passage is about.

Title: _____

All organisms and their cells need to maintain homeostasis. However, keeping a stable internal environment when the environment around the cell is constantly changing makes the job difficult. Therefore, the cell needs to separate itself from the external environment.

This job is accomplished by the cell membrane because it is selectively permeable. Consequently, only some molecules can get through the membrane. The selectively permeable nature of the plasma membrane is partly because of the make up of the membrane. The membrane has a double layer of protein. Water and small, non-charged molecules can pass freely through the membrane. Larger, charged molecules cannot pass through the plasma membrane easily.

Details: _____

_____

_____

APPENDIX G

INSTRUCTIONAL COACHING MAPS

Observation

Coaching Map on _____
(Date)

For _____ with _____
(PI/Coach) (Instructor)

Directions: Please follow these steps during observing instruction using the CER.		Partnership Principles
☐	1. Arrive in the classroom well before the lesson to confirm that the instructor wants you to observe the lesson.	
☐	2. Bring a copy of the CTB checklist and find an inconspicuous spot in the classroom where you can observe the instructor and the students.	
☐	3. Put a 1 or 2 in the box beside each behavior you observe the instructor implement. Mark zero (0) in the box beside each behavior that you do not see.	
☐	4. Be especially attentive for anything the instructor does well. Write brief descriptions of all the strengths of the lesson in the Evidence/Notes areas.	
☐	5. Before leaving the classroom, set up a time when you will meet with the instructor to discuss the lesson.	

Rating Guide: 2 = Present and correct; 1 = Present, but needs improvement; 0 = Missing or incorrect

Partnership Principles: **E**quality, **P**raxis, **D**ialogue, **C**hoice, **V**oice, re**F**lection, **R**eciprocity

Adapted from jcornett (Kansas Coaching Project) by fihle & pgraner 4.25.09 for the University of Kansas Center for Research on Learning Job Corp Vocational Literacy Project Grant# R305B070129; Updated for Text Pattern Intervention by fihle 10.7.10

Collaborative Exploration of Data

Directions: Please follow these steps to invite instructor input and provide feedback following the CER observation.

		Partnership Principles:
☐	1. Meet the instructor as soon as possible following your observation of the instructor implementing the lesson.	
☐	2. Ask the instructor how they think the session went. Listen carefully to each of the instructor's comments. What were their thoughts about the lesson?	
☐	3. Share the completed CTB checklists with the instructor.	
☐	4. Be direct, specific, and non-attributive about what you considered to be the positive elements of the lesson.	
☐	5. Share potentially negative information non-judgmentally and provisionally (e.g., "This is what I wrote down, how do you see it? Did I get this right, or did I miss something?").	
☐	6. Co-Identify what you'd like the instructor to do differently on their next attempt at teaching the intervention.	
☐	7. Identify how you can support the instructor further (i.e., more discussion, another modeling, another observation).	
☐	8. Before leaving, schedule a time for the next observation and coaching sessions and thank the instructor for their input.	

Rating Guide: 2 = Present and correct; 1 = Present, but needs improvement; 0 = Missing or incorrect

Partnership Principles: **E**quality, **P**raxis, **D**ialogue, **C**hoice, **V**oice, re**F**lection, **R**eciprocity

Adapted from jcornett (Kansas Coaching Project) by fihle & pgraner 4.25.09 for the University of Kansas Center for Research on Learning
Job Corp Vocational Literacy Project Grant# R305B070129; Updated for Text Pattern Intervention by fihle 10.7.10

APPENDIX H

SATISFACTION SURVEYS

Teacher Satisfaction Survey

Teacher's Name _____ Date_____

I am interested in your impression of the Text Pattern intervention and would appreciate your feedback. Please indicate on the following seven-point scale the extent to which you agree or disagree with the following statements:

	Completely disagree			Neither agree nor disagree			Completely agree
1. This intervention improved my students' ability to identify and understand text patterns.	1	2	3	4	5	6	7
2. Once I understood the intervention, it was easy for me to use with my students.	1	2	3	4	5	6	7
3. The time it took to understand how to implement this intervention was worth the benefits that followed.	1	2	3	4	5	6	7
4. This intervention enhanced my students' reading comprehension skills.	1	2	3	4	5	6	7
5. This intervention enhanced my students' writing skills.	1	2	3	4	5	6	7
6. This intervention enhanced my students' verbal (listening and speaking) comprehension skills.	1	2	3	4	5	6	7
7. I will continue to use all parts of the intervention in the future.	1	2	3	4	5	6	7
8. I will adapt and use only certain elements of the intervention in the future.	1	2	3	4	5	6	7
9. This intervention fits with my teaching style, goals, and vision.	1	2	3	4	5	6	7
10. I would recommend the use of this intervention to other reading and/or writing teachers.	1	2	3	4	5	6	7

Student Satisfaction Survey

Student's Name _____ Date_____

Satisfaction with Instruction Survey
Please indicate how satisfied you are with the Text Pattern Intervention as a way to better understand what you read. Answer each of the questions by circling the number that best describes whether or not you agree with the items related to the intervention. A response of **"1"** means that you **completely disagree** with the statement while a response of **"7"** means that you **completely agree**.

After learning about text patterns…	**Completely disagree**			**Neither agree / disagree**			**Completely agree**
1. I have developed more variety when choosing to use action verbs.	1	2	3	4	5	6	7
2. I now better understand the difference between passive and active verbs.	1	2	3	4	5	6	7
3. I know how to use several different suffixes to change verbs into nouns.	1	2	3	4	5	6	7
4. I understand how to structure noun phrases with descriptive words and prepositions.	1	2	3	4	5	6	7
5. I have gotten better at recognizing temporal and causal relationships in the passages that I read.	1	2	3	4	5	6	7
6. I know how to use temporal conjunctions and transitions to structure well written sentences.	1	2	3	4	5	6	7
7. I know how to use causal conjunctions and transitions to structure well written sentences.	1	2	3	4	5	6	7
8. I recognize the relationship between tracking identifiers and the ideas they refer back to.	1	2	3	4	5	6	7
9. I better understand why writers use text patterns to explain their ideas.	1	2	3	4	5	6	7
10. My reading comprehension skills have improved.	1	2	3	4	5	6	7

APPENDIX I

INSTRUCTIONAL SESSIONS

When?	What?	How?	Who?
Session 1	Pretests	○ Test of Silent Contextual Reading Fluency (TOSCRF) ○ Maze procedure ○ Content area passage questions	• Intervention class • Comparison class
Session 2	Pretests	○ Oral and Written Language Scales (OWLS) ○ Reading Self-Concept Scale	• Intervention class • Comparison class
Session 3	Lesson 1— Active Verbs	○ **Describe**: Action verbs and 3 types with CC #1 ○ **Model**: Doing verbs with CC #2 and learning sheet 1.1 ○ **Controlled Practice**: Learning sheet 1.2 and feedback	• Intervention class
Session 4	Lesson 1— Active Verbs	○ **Model**: Saying verbs with CC #3 and learning sheet 1.3 ○ **Controlled Practice**: Learning sheet 1.4 and feedback	• Intervention class
Session 5	Lesson 1— Active Verbs	○ **Model**: Thinking verbs with CC #4 and learning sheet 1.5 ○ **Controlled Practice**: Learning sheet 1.6 and feedback	• Intervention class
Session 6	Lesson 2— Passive Verbs	○ **Generalization**: Activities to c/c doing, saying, and thinking verbs ○ **Describe**: Linking verbs definition and list ○ **Model**: Red cards and fill in the blank sentences ○ **Controlled Practice**: Learning sheet 2.1 and feedback	• Intervention class
Session 7	Lesson 2— Passive Verbs	○ **Describe**: Helping verbs definition, list with CC #5, and complete verb identification ○ **Model**: Fill in the blank sentences with Yellow AND red cards; Verb-subject identification procedure with CC #6 (VPs)	• Intervention class
Session 8	Lesson 2— Passive Verbs	○ **Controlled Practice**: Learning sheet 2.2 and feedback ○ **Model**: 5 verb types clustered into active and passive verbs with CC #7 and learning sheet 2.3 ○ **Advanced Practice**: Learning sheet 2.4a, feedback, and 2.4b if needed	• Intervention class
Session 9	Lesson 2— Passive Verbs	○ **Advanced Practice**: Learning sheet 2.4a, feedback, and 2.4b if needed ○ **Generalization**: Activities to c/c active and passive verbs	• Intervention class

Session 10	Lesson 3—From Verbs to Nouns	○ **Describe:** Verb scenarios w/ pictures and review verb-subject identification procedure ○ **Model:** V-S ID with CC #6 (NPs)	• Intervention class
Session 11	Lesson 3—From Verbs to Nouns	○ **Model:** Suffixes and noun scenarios with CC #8 and convert verbs to nouns with learning sheet 3.1	• Intervention class
Session 12	Lesson 3—From Verbs to Nouns	○ **Controlled Practice:** Learning sheet 3.2a, feedback, and 3.2b if needed ○ **Generalization:** Activities where suffixes do not work	• Intervention class
Session 13	Lesson 4—Noun Phrases	○ **Describe:** Reminder about V-S ID procedure and suffixes ○ **Model**: Breaking down NPs by c/c verbs vs. NPs ○ **Describe**: Structuring NPs with CC #9 and 12 ○ **Model**: Describing words with CC #10 and learning sheet 4.1 with CC #7	• Intervention class
Session 14	Lesson 4—Noun Phrases	○ **Model**: Ordering words with CC #11 and learning sheet 4.2 ○ **Model**: Prepositional phrases with learning sheet 4.3	• Intervention class
Session 15	Lesson 4—Noun Phrases	○ **Controlled Practice**: Learning sheet 4.4a, feedback, and 4.4b if needed ○ **Generalization**: Activities with content area textbooks	• Intervention class
Session 16	Lesson 5—Connectives	○ **Describe**: Temporal joiners definition, list on CC #13, and icon ○ **Model**: Sentence strips and learning sheet 5.1 with conjunctions	• Intervention class
Session 17	Lesson 5—Connectives	○ **Model**: Sentence strips and learning sheet 5.2 with temporal transitions ○ **Controlled Practice**: Learning sheets 5.3a and 5.3b and feedback	• Intervention class
Session 18	Lesson 5—Connectives	○ **Describe**: Causal joiners definition, list on CC #13, icon, and c/c positive and negative relationships ○ **Model**: Sentence strips and learning sheet 5.4 with conjunctions	• Intervention class
Session 19	Lesson 5—Connectives	○ **Model**: Sentence strips and learning sheet 5.5 with causal transitions ○ **Controlled Practice**: Learning sheets 5.6a and 5.6b and feedback	• Intervention class
Session 20	Lesson 5—Connectives	○ **Generalization**: Activities with content area textbooks and charades	•
Session 21	Lesson 6—Identifiers	○ **Describe:** Tracking vs. introducing identifiers with CC #14 ○ **Model:** Learning sheet 6.1	• Intervention class
Session 22	Lesson 6—Identifiers	○ **Model:** Learning sheet 6.2 ○ **Controlled Practice:** Learning sheet 6.3 and feedback	• Intervention class

Session 23	Lesson 6—Identifiers	○ **Controlled Practice:** Learning sheet 6.4 and feedback ○ **Generalization:** Activities with content area textbooks	• Intervention class
Session 24	Lesson 6—Identifiers	○ **Controlled Practice:** Learning sheet 6.5 and feedback ○ **Generalization:** Activities with content area textbooks	• Intervention class
Session 25	Lesson 6—Identifiers	○ **Advanced Practice:** Learning sheet 6.6a and feedback ○ **Generalization:** Activities with content area textbooks	• Intervention class
Session 26	Lesson 6—Identifiers	○ **Advanced Practice:** Learning sheet 6.6b and feedback ○ **Generalization:** Activities with content area textbooks	• Intervention class
Session 27	Lesson 6—Identifiers	○ **Advanced Practice:** Learning sheet 6.7a and feedback ○ **Generalization:** Activities with content area textbooks	• Intervention class
Session 28	Lesson 6—Identifiers	○ **Advanced Practice:** Learning sheet 6.7b and feedback ○ **Generalization:** Activities with content area textbooks	• Intervention class
Session 29	Lesson 6—Identifiers	○ **Advanced Practice:** Learning sheet 6.8a and feedback ○ **Generalization:** Activities with content area textbooks	• Intervention class
Session 30	Lesson 6—Identifiers	○ **Advanced Practice:** Learning sheet 6.8b and feedback ○ **Generalization:** Activities with content area textbooks	• Intervention class
Session 31	Lesson 6—Identifiers	○ **Advanced Practice:** Learning sheet 6.9a and feedback ○ **Generalization:** Activities with content area textbooks	• Intervention class
Session 32	Lesson 6—Identifiers	○ **Advanced Practice:** Learning sheet 6.9b and feedback ○ **Generalization:** Activities with content area textbooks	• Intervention class
Session 33	Lesson 6—Identifiers	○ **Advanced Practice:** Learning sheet 6.10a and feedback ○ **Generalization:** Activities with content area textbooks	• Intervention class
Session 34	Lesson 6—Identifiers	○ **Advanced Practice:** Learning sheet 6.10b and feedback ○ **Generalization:** Activities with content area textbooks	• Intervention class